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THE PHILOSOPHY OF JOHN W. GATES

John W. Gates may not be the highest type of citizen in the land, but, he has nevertheless, a head full of sense. He may not have trod the straight and narrow path without deviation, but perhaps, after all, he has not deviated more than others whose lives are apparently examples of rectitude. John W. Gates publishes his shortcomings, or at any rate they get published, while other men do all they can to hide their limitations or their departures from the path which leadeth straight. Whatever may be said of Mr. Gates no one can say that he is a humbug. There isn't a strain of cant or hypocrisy about him. He is a man's man throughout and while we don't pretend to say that we put the stamp of approval upon Mr. Gates still we think that a whole lot of human nature was coralled in his make-up. Says Mr. Gates in Chicago:

"There's been an awful lot of rot sent out from Saratoga by newspaper correspondents about my winning and losing at the track and elsewhere. It's probably entertaining reading, but it's silly when considered from the standpoint of fact. They talk about suppressing gambling—you might as well talk about suppressing the wind. Men have always gambled and they always will. If I had my way I'd license gambling, as saloons are, because I think it is right, and regulation is better than the present system.

"I've got a boy that I'm proud of. I play golf and tennis and ping pong with him, and when he wants to play poker I play with him, and I get stung good and hard every now and then. If he wants to go somewhere else and try his luck I'm with him, and if he wants me I go with him, just because I want my boy to feel his daddy is his chum, as well as the best friend. That's the way a boy should be brought up, and he should know how to meet the world from actual experience. Speaking about boys, my reflection on this subject led me to go in heavily for this rural home for boys at St. Charles under the auspices of the state of Illinois and the Commercial club, worked out by Henry E. Weaver and Judge Tuthill. I had a pretty hard row when I was a boy and I want to make the road easier for all the boys I can. I believe boys should be handled with less restraint and taught the actual things of life in a practical way, and that's what will be done at St. Charles. We will make that school the greatest thing in the world for boys.

"Marshall Field once told me that he tried to be right 51 per cent. of the time, and there's a lot in that. The fellow who makes up his mind to be right all the time will lose in the long run to the man who insists on being right 51 per cent. of the time. This same Marshal Field is one of the greatest business men in the country, and I think the third richest, next to John D. Rockefeller and Andrew Carnegie. I believe he is worth $200,000,000, and he has never borrowed a dollar in his life.

"There'd be fewer bank collapses in this country if bank presidents and other bank officers would borrow less from their own banks and more from the other fellows. A man ought not to borrow money from his own bank—if his securities are good another bank will lend him what he needs, and if they are not, he ought not to unload them on his own institution.

"I am a firm believer that this is the golden era for the United States. The era of combination will bring this era, not only for capital but for labor, for the man established in business as well as the young man about to start. The trust has not put out the light of the young man. That's all rot. I don't believe every feature of every trust is good, but that which has come to be known as the community of interest plan is bound to make this country greater than it is today, and in the greater America what a chance there will be for the young man! In this age of combination there is not and will not be for the young man so great a chance for success, per man, as there was under the old conditions, but for the young man of ability—ability of head or hands—the percentage of profit will be much greater. The profits of commercial life or the profits of production will not be so widely distributed, but those who get them will get more, per man, than anybody ever got before. It follows from this that the bright young man, the industrious ones, the steady and level-headed ones, will win the prizes of the future, and the mediocre and complaining ones and the drones will have to struggle along on salaries the best way they can, just as they do now. Industrial combination is the savior of labor, because it insures reasonable wages, reasonable hours and steady employment, and this last is the most important thing of all."

Ten years ago the first cargo of iron ore entered the port of Conneaut. The first cargo taken there was that of the steamer Kershaw, which landed 2,270 tons of ore for transportation to Pittsburg in 1892. Since then it has become the ore port of first importance on Lake Erie.

SUPERVISING INSPECTOR GENERAL'S REPORT.

The annual report of Gen. James A. Dumont, supervising inspector-general of the United States steamboat inspection service contains the following interesting paragraph:

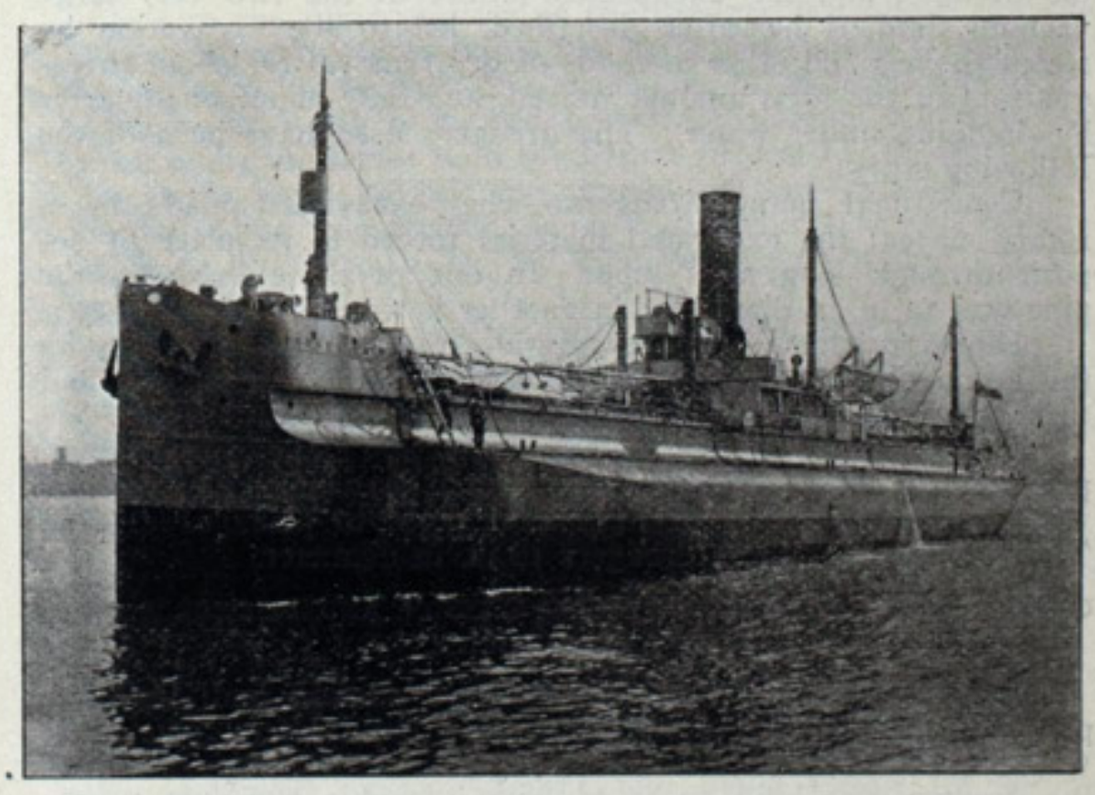
"During the years 1872 to 1876, inclusive, the average annual number of lives lost was 576; average annual number of steamers inspected, 3,804. During the following twenty-six years, 1877 to 1902, inclusive, the average number of lives lost was but 253 and the average annual number of steamers inspected 6,760, in the first period showing an annual average loss of life of one person to about every seven vessels inspected, in the latter period a loss of life of but one person to each twenty-seven vessels inspected, a decrease in number of lives lost between the two periods of 56 per cent. in favor of the latter period, notwithstanding the fact that the number of lives at stake has increased fully 300 per cent."

Regarding the explosion of the boilers of the City of Trenton in August, 1901, he says: "The exploded boiler had only been in use a few weeks; was thoroughly built of the best material, every plate having been tested at the mill by the United States assistant inspector. The evidence, as shown by the ruptured crown sheet of the boiler, is, in the opinion of this office, conclusive that the explosion was caused by allowing the water above the crown sheet to fall below the limit of safety, resulting naturally in the lamentable explosion that followed."

TEST OF THE CARLEY LIFE FLOATS.

The Carley float, a new form of life saving raft, was tested last week in the lower New York harbor. It is understood that it has already been put in some of the battleships of the navy and of the army transports. It consists of a copper tube with many air-tight compartments. The tube is covered with 2 in. of compressed cord and wound with canvas. Attached to this cylinder is a rope netting, 3 ft. deep, from which is suspended by rings, which travel on lashings, a wood slatted bottom. The float is made in such a manner that no matter on which side it may fall on the water, the bottom falls through and is in its proper relation to the buoyant cylinder. Those who get on the float stow themselves inside this elliptical device, the wood-slatted bottom sinking about 3 ft. by their weight. The cylinder which floats on the water, is about their waists. They are not in danger of being swept off and can keep afloat until picked up. The test proved altogether successful. It kept an even keel and was rowed about easily.

THE BRITISH INVASION.



The Turret Chief, a type new on the Great Lakes. Built at Newcastle-on-Tyne and owned by Wm. Petersen Co., Ltd., Toronto.

Remarkable regularity is noted in the eastbound trips of the American Line steamer Philadelphia. She sailed from New York Aug. 27 at 10 a. m., cleared the bar at 11:30 a. m; passed the Lizard Sept. 3 at 4 a. m. and arrived Southampton on same day at 1 p. m. She sailed from New York on Sept. 17 at 10 a. m., cleared the bar at 11:30 a. m., passed the Lizard Sept. 24 at 4 a. m. and arrived at Southampton at 1 p. m. The time for each passage from New York dock to Southampton dock was 6 days and 22 hours.

DREDGING MACHINES.

Construction, Capacity and Cost of Operating Dredging Machines of Several Types in Recent Excavations of large Magnitude.*

Excavations for a large canal have been in progress under the direction of the writer during the years 1897, 1898, 1899, 1900 and 1901. In this period there have been moved 5,868,000 cu. yds. Of this material 1,436,000 cu. yds. were excavated under water by dredges of several different types, and 4,432,000 cu. yds. were excavated above ground by steam shovels and certain special forms of graders and excavators and conveyors, this latter amount including 88,700 cu. yds. of rock requiring blasting. The canal is in St. Lawrence county, New York, and connects the St. Lawrence river with the Grasse river. Its length is 16,200 ft. It carries water from the St. Lawrence river above the Long Sault rapids to the Grasse river, the water of which is at this point about 44 ft. below that of the St. Lawrence. Here there has been built a power house for the development of water power and electricity. The design for the complete works includes a lock to transfer vessels from the canal to the Grasse river, and through that river to the St. Lawrence below the rapids. The lift of this lock will vary with the elevation of the water in the two rivers—never exceeding 45 ft. The alignment of the canal is very direct. It has but three curves, each of 5,730 ft. radius. There are two deep excavations, each about 3,000 ft. long, in which the natural surface has a maximum elevation of about 72 ft. above water-surface in the canal. Throughout the remainder of its length the natural surface averages from 12 to 14 ft. above water-surface. The whole canal is in excavation.

The St. Lawrence river, at the entrance to the canal, fluctuates in height about 2½ ft. as a maximum. The fluctuations in the Grasse river are generally 4½ ft., the river being near its low stage during the greater part of the year. Occasionally the river has attained the height of 14 ft. above low water for a few hours. This occurs only under certain conditions of ice in winter, which set the water back. The area of the water section of the canal when finally completed will be 5,870 sq. ft. The dimensions below water surface will be 187½ ft. wide at bottom, 265 3 ft. wide at water surface, 25.93 ft. depth of water. The total excavation requisite to secure this water section will amount to 7,760,000 cu. yds. After some progress had been made, it was decided to excavate at first a canal with a water section of 2,574 sq. ft., the reduction being made so as to permit the development of a large amount of power sooner than could be done if the whole excavation were completed before transmission of water through the canal. The canal with this reduced section has been completed. The present dimensions below water surface are: 155.8 ft. wide at bottom; 199.3 ft. wide at water surface; 14.5 ft. depth of water.

The material excavated was largely alluvial deposit. A soft gray clay, with some sand, some gravel, some boulders and with loam at the surface, was found everywhere, except at the two high ridges. At these the material was an indurated clay with gravel and large boulders. This indurated material was very difficult to excavate. Power and dynamite were used freely in all excavations made above water. Very powerful steam shovels could not work advantageously until the indurated material was blasted; the conditions of the locality, difficulty in obtaining suitable dredges, and the unexpected failure of the two very large vacuum dredges hereafter described, led to the excavation by steam shovels and other methods of dry removal for about three-quarters of the total amount moved, and only about one-quarter by dredging under water. The dredgers used have been of the following types:

Centrifugal pump dredgers.—The excavation made by a rotary cutter; the excavated material forced to its place of deposit through long steel pipes. In one of these dredgers the pipe was 12 in. in diameter; in another it was 18 in. in diameter.

Dipper dredgers.—The excavation made in the usual way by the scoop dipper with moveable back; deposited in scows, and these towed by tugs to the place of deposit in water.

Vacuum pump dredgers.—The excavation made by an orange-peel bucket, deposited in a hopper and transmitted by use of vacuum chamber through long steel pipes to place of deposit. This pipe was for these dredgers 18 in. in diameter.

CENTRIFUGAL PUMP DREDGER WITH SUCTION AND DISCHARGE PIPES OF 1 FT. DIAMETER.

The centrifugal pump dredger with suction and discharge pipes of 1 ft. diameter was built on the ground where some excavation had been made; water was pumped to this excavation after the dredger was built so as to float it, and a sufficient supply of water was continued by pumping to allow the dredger to work without interruption. The hull is southern pine, 65 ft. long, 30 ft. wide, 6 ft. deep. The longitudinal timbers on bottom are 8x12 in. and 3 ft. center to center. The timbers on each side of the center are double 16x12 in. The side uprights are 6x8 in. and 3 ft. center to center. The whole is covered by plank 3 in. thick. At the front of the hull is an A frame of timber 12x12 in., reinforced by two steel 1¾-in. rods to each timber. The top of this frame is 45 ft. high above the deck. It is anchored by two other timbers 12x12 in., running from its top back to each side of the hull 24 ft. from the front, and also by 2-in. rods from its top to each side of the deck at the middle of the hull. Six feet above the deck is a cross-piece on the A frame, the center of which supports the foot of a timber boom or frame, the other end of which is supported by a wire cable from the top of the A frame. At the end of the boom are three sheaves, each carrying wire cable; two of these swing the dredger from side to side, the other raises and lowers the timber frame which supports the suction pipe, the cutting instrument and the shaft operating this cutter. At the stern of the hull are two anchoring spuds of timber, 9x16 in. and 40 ft. long. These are raised or lowered by cables running through sheaves on a square timber frame, and by means of these spuds the dredger is held in position and is moved forward or backward by raising one spud, swinging the hull, dropping that spud, raising the other, and swinging in the other direction.

The moveable frame is 45 ft. long, made of two timbers, each 12x12 in., with space between them for the suction pipe, 12 in. in diameter. A shaft of steel 4 in. in diameter is above the suction pipe. The frame and its appurtenances is raised, lowered and held in position by the cable from the A frame passing through the sheave at end of boom and running to the engine. The suction-pipe and cutter-shaft are jointed so as to allow free vertical movement of their supporting frame. The cutter is composed of blades which radiate from the end of the shaft and are curved backward and connected at their outer ends by a ring of metal, thus forming a skeleton, basket-shaped frame, 3½ ft. in diameter at base and 2 ft. 10 in. deep. The shaft passes through the center of this cage and the blades are forged together and attached to the end of the revolving shaft. The number of blades varies with the character of the material excavated, adhesive material and clay requiring greater space between the blades than free friable earth or sand. In the soft clay excavated by this machine a space of about 2½ in. between the blades was found advisable. The end of the suction pipe is fixed at the rear or base of this cutter. When the shaft and cutter revolve, the blades loosen and cut into the material against which the cutter is held. This disintegrated material passes between the blades into the interior of the basket and thence directly into the suction pipe with a volume of water ranging with the character of material excavated. This pipe goes directly to the centrifugal pump. This pump is connected to a separate compound condensing engine of 125 H. P. It is capable of operating against a head of 60 ft. It delivers the water and excavated material directly into the pipe which passes out from the stern of the dredger. This pipe is of wrought iron, spiral-riveted. Its lengths are connected by flanges bolted together, and at convenient intervals there are placed sections of heavy rubber pipe 6 ft. in length, thus permitting all requisite changes of alignment. The length of the discharge pipe actually used for this work was generally 1,200 ft. The pump forced the water and material through this and greater lengths of pipe without difficulty. The lift above the surface of the water in which the dredger floated averaged 30 ft.

The Lidgerwood engine, which does all the work except actuating the pump, is in the forward part of the boat and has a cylinder 6¼x10 in., link motion, with six drums. One drum raises and lowers the cutter and suction pipe; two drums swing the boat from side to side, and two raise and lower the anchoring spuds. The same engine turns the shaft of the cutter. The boiler is of 125 H. P. and supplies steam at a pressure of 125 lbs. Every movement of the machinery is controlled by one man, operating levers placed in a house on the upper forward deck of the dredger. As the cutter revolves, the frame carrying it and the outer end of the suction pipe is slowly moved sideways, the whole boat swinging upon one of the anchored spuds as a pivot, until the edge of the required excavation is reached. The frame is then lowered enough to cut another slice of material, and then moved in the other direction. This operation is repeated until the proper depth is attained. Then the dredger is moved backward for another cutting.

The water with the excavated material is delivered at the outer end of the discharge pipe. The amount of material carried with the water varied from 7 to 30 per cent. The usual running average of excavated material was about 25 per cent. The semi-fluid mass was so directed that it spread over a considerable area of land, depositing the solids gradually, the water running to one of the rivers or at certain points back into the canal. When sufficient area was provided so that there was time for precipitation, the water became quite clear. When it ran to the river within a short time it carried with it about 2¼ per cent. of suspended material. This dredger was not able to excavate the indurated material above described. It did excavate successfully the soft clay and loam and sand, separately or as they occurred in combination. It worked continuously throughout each season, except when ice prevented. Rain and bad weather did not interfere with it. It was run 22 hours during each 24 hours, except on Sundays. It was served by two sets of men, each working 11 hours. It excavated and delivered during three seasons 459,800 cu. yds. The cutting was made to a maximum depth of 22 ft. below the surface of water in which the dredger floated and the material was raised an average of 30 ft. above that water and deposited an average of 1,200 ft. from the dredger. This dredger requires for its operation one captain, one engineman, one oiler, one fireman, one foreman of deck hands, and three men. The compensation of the force at the average rates paid during

*From a paper read before the International Navigation Congress at Dusseldorf, by Mr. John Bogart, M. Am. Soc. of C. E.

the progress of this work amounted for each shift of eleven hours to $17.95, or

For each day of twenty-two hours	$35.90
Oil, waste, etc., for twenty-two hours	5.00
Coal, 9 tons at $3 for twenty-two hours	27.00
Total each twenty-two hours	$67.90

This amount includes the labor required in placing and taking care of the discharge pipe as well as in operating the dredger. The pay of the deck hands, the lowest-priced labor employed on this dredger, was $1.65 for the eleven hours, or 15 cents per hour. The above cost of $67.90 thus equals 41.18 days' pay of this class of labor. These laborers were selected as partially skilled men, the pay of common unskilled labor being 12½ cents per hour, or 1.375 per day of eleven hours. The price of coal is more than it would be in many parts of the United States.

The cost of this dredger was $40,000. Interest at 4 per cent. is $1,600 per annum. The life of the dredger would not exceed about ten years—that is to say, it would not require an expenditure equal to the original cost of the dredger to keep it in constantly good condition, and to have it in that condition at the end of ten years. There must therefore be charged against the work done $4,000 per annum for repairs and renewals; and $1,600 per annum for interest. In the locality of this canal, and generally in the northern parts of the United States, dredging can only be done during about eight months of the year. The annual cost for repairs, renewals, and interest must in this particular case be distributed over the actual working days, say $26.80 per working day. The dredger must be cared for during the winter season, at a cost, which, distributed over the actual working days, may be charged at $1 per working day. The total cost per actual working day of twenty-two hours is thus:

Labor and supervision	$35.90
Coal at $3 per ton	27.00
Supplies	5.00
Interest, repairs and renewals	26.80
Care during winter	1.00
Total	$95.70

As stated above, this dredger excavated during three seasons 459,800 cu. yds. Very careful observations were made of actual working days occupied in the excavation of 218,250 cu. yds. This amount was excavated and discharged in 194 working days, thus giving for this large volume an average of 1,125 cu. yds. per day of twenty-two hours. The average cost was thus, with allowance for repairs, renewals, care in winter, coal, supplies, and labor, 8.507 cents per cu. yd. It will be observed that if the cost of labor, coal, and supplies alone was taken into consideration, the resulting average cost would be 6.035 cents per cubic yard. This compares with statements of cost of dredging which have been made with reference to other works. The cost of capital invested and of repairs and renewals is certainly an actual element of cost of work done.

CENTRIFUGAL PUMP DREDGER WITH SUCTION AND DISCHARGE PIPE OF 18 IN. DIAMETER.

The centrifugal pump dredger with suction and discharge pipe of 18 in. diameter was substantially of the same construction as the one with 12-in. suction and discharge pipe already described quite fully. All parts were correspondingly larger. The hull of this dredger was that of one of the vacuum dredgers, hereinafter referred to, which was capable of economically working in this material. The hull is 103 ft. long, 34 ft. wide and 10 ft. deep. The vacuum machinery and the excavating bucket and all attachments were removed. A centrifugal pump, 18-in. suction and discharge, and an engine, drums, cutter, cutter shaft, suction pipe and other machinery were put in. The mode of operating this dredger is exactly the same as the 12-in. one already described. It excavated similar material. It worked through two seasons except when ice prevented. It was run twenty-two hours each day, except Sundays, and was managed by two sets of men, each working eleven hours. It excavated and delivered during two seasons 290,780 cu. yds. The cutting was made to a depth of 22 ft. below the surface of the water in which the dredger floated, and the material was raised an average of 30 ft. above that water, and deposited an average of 1.200 ft. from the dredger. This dredger requires for its operation one captain, one engineman, one oiler, one fireman, one spud-tender, one foreman of deck hands and three men. The compensation of this force at the average rates paid during the progress of the work amounted for each shift of eleven hours to $20.95, or

For each day of twenty-two hours	$ 41.90
Oil, waste, etc., for twenty-two hours	8.00
Coal, 18 tons at $3. for twenty-two hours	54.00
Total each twenty-two hours	$103.90

This included placing and taking care of the discharge pipe. The cost of a new dredger similar to this one would be $60,000. Interest at 4 per cent. is $2,400 per annum Repairs and renewals, as explained for the similar dredger, would be for this dredger $6,000 per annum. These distributed over actual working days would be $40.19 per working day. The care during winter distributed over the actual working days cost $1 per day.

The total cost per actual working day of twenty-two hours is thus:

Labor and supervision	$ 41.90
Coal at $3 per ton	54.00
Supplies	8.00
Interest, repairs and renewals	40.19
Care during winter	1.00
Total	$145.09

Careful observations show that this dredger excavated and discharged 246,983 cu. yds. in 160 working days, thus giving an average of 1,543.6 cu. yds. per day of twenty-two hours. The average cost was thus, with allowance for repairs, renewals, care in winter, coal, supplies and labor, 9.399 cents per cubic yard.

OPERATIONS OF DIPPER DREDGES.

The excavation made by dipper dredges and delivered into scows at side of dredgers amounts to 525,306 cu. yds. One of these dredgers has a dipper with a capacity of 2½ cu. yds. The dipper has three steel teeth, about 6x5 in. The hull is 85 ft. long, 28 ft. wide and 10 ft. deep. There are three anchoring and supporting spuds, each 20 in. square. The dipper arm is 28 ft. long, of wood sheathed with steel. The material was delivered into scows, each having a dropping pocket with a capacity of 140 cu. yds. A tugboat took these scows in turn into the St. Lawrence river, dropping the excavated material in a bay near the mouth of the canal. The distance to which the scows were towed averaged about 5,500 ft. The dipper dredger worked ten hours per day. The tug and scows could not be operated at night. The dredger excavated to a depth of 20 ft. below water surface.

The cost of operating this dredger, including the crew of dredger, tug and scows, coal, supplies, etc., was for each day of ten hours $30.56. The cost of dredger, tug, and two scows is $43,000. Interest at 4 per cent. is $1,720 per annum. One-tenth cost for repairs and renewals is $4,300 per annum. These distributed over actual working days, would be $28.80 per working day. Care during winter months, distributed over working days, $1 per day. The total cost per actual working day of ten hours is thus:

Labor, supervision, coal and supplies	$30.56
Interest, repairs and renewals	28.80
Care during winter	1.00
Total	$60.36

This dredger excavated, delivered into scows, and deposited in the river 138,001 cu. yds. in 183 days of ten hours, thus giving an average of 754.1 cu. yds. per day of ten hours. The average cost was thus, with allowance for repairs, renewals, care in winter, coal, supplies and labor, both for dredger, scows, and towing tugs, 8.004 cents per cubic yard. This excavation was in indurated material, as described above. Neither the centrifugal pump dredgers nor the orange-peel bucket dredgers referred to below could excavate this material.

Another larger and heavier dipper dredger worked during one season. This has a dipper with a capacity of 6 cu. yds., with which it excavated the indurated material, depositing it into scows in the same manner as the dredger last above described. The location of its working was such as to make it impracticable to keep an account of the amount of material moved by it during sufficiently prolonged periods to warrant an exact statement and comparison with the figures of cost of the other dredgers above given. While the amount per day excavated by this large dredger was greater, the cost per cubic yard was about the same as that shown by the smaller dipper dredger as given directly above.

Another dipper dredger, with a scoop of 1½ cu. yds. capacity, worked during one season. It was quite similar to the one with the dipper of 2 cu. yds. capacity, and the cost of excavating and depositing material by it was the same as stated above.

VACUUM ORANGE-PEEL DREDGERS.

Soon after the beginning of the work on this canal, two large dredging machines were built at Buffalo, and brought by water to the canal. The designers of these machines expected that they would give effective and economical results, both in the indurated and in the softer material. The two machines were of exactly the same design and construction. The hull is 103 ft. long, 34 ft. wide and 10 ft. deep. There are two decks, the upper one having sleeping and living rooms for the captain and all hands. All parts of the hull and upper works are strongly braced with heavy timbers and steel rods. The dredger is provided with large water tanks and coal hoppers. There are three anchoring spuds—two forward and one near astern. These are operated by an independent double drum engine. There are two marine boilers, each of 150 H. P., supplied with water by two Blake pumps. Two steel vacuum chambers are near the center of the boat, each cylindrical, 5 ft. in diameter, 19 ft. high. There is a hopper attached to the bow of the dredger, 40 ft. long, 12 ft. wide, built of I-beams covered with ⅜-in. steel.

The bottom of the hopper slopes to the center of the boat. A suction pipe, 18 in. in diameter, runs from the center of the hopper into and close to the bottom of the hull, backward 35 ft.,

where it connects by a Y to two pipes, also 18 in. in diameter, going to the two vacuum chambers. From each of these an 18-in. pipe leads aft to a Y, whence an 18-in. discharge pipe passes out from the stern of the boat. There are four 18-in. valves, one in each branch of each Y. These valves are separately operated by steam pistons controlled at the pilot house. In the hopper at the entrance to the suction pipe is a cutter with four 2½-in. blades. This cutter is run by a separate double-cylinder engine. A high-pressure Blake pump, 10-in. suction and 8-in. discharge, supplies water to the hopper. A heavy A frame, 26 ft. from the bow, carries a cable passing from the engine drum to the other end of a boom 40 ft. long. This frame also carries the cables for operating the dredger bucket. This bucket is suspended from two sheaves, 30 in. in diameter, near the end of the boom. The bucket has a capacity of 4 cu. yds. It is of the form known as the Hayward orange-peel type, so-called from its resemblance to the peel of an orange when cut into quarter pieces. It has four triangular curved blades, which, when closed, form a tight semi-spherical bowl. When open the blades resemble sharp spades, and are so adjusted to steel arms, connecting rods and cables, that the maximum downward digging effect is produced with but slight tendency to lift the bucket until closed. The dredging is done by the main engine placed at the back of the pilot house. This has cylinders 14x18 in. and two drums 30 in. in diameter carrying the hoisting cables. A 4-in. high-pressure Blake pump supplies water to the vacuum chambers and is regulated by pressure valves, so that it will stop acting when the chambers have the requisite pressure. A direct current generator supplies electric light. All machinery is controlled by levers placed in the pilot house at the bow of the boat.

The dredging is done by the orange-peel bucket in the ordinary manner. This lifts the material from the bottom or sides of the excavation and drops it into the hopper, which is supplied with water by the large pump. The cutter is revolving in order to disintegrate the mass of excavated material. Steam is turned into one of the vacuum chambers, and then cold water is pumped in through a spray, condensing the steam and forming a vacuum. The forward valve is then opened and the water and excavated material drawn from the hopper into the chamber. The valve is then closed, the rear valve opened, steam turned into the chamber, forcing the water and excavated material into and through the discharge pipe. While one vacuum chamber is discharging the other should be filling, their work alternating and the discharge made practically continuous. An orange-peel bucket with a capacity of 1 cu. yd. had been successfully operated in excavating the soft clay from the canal near the Grasse river. This was supported on a moveable platform on land. The clay was wet but not under water. It was expected that this large floating dredger would be more advantageous. It was found, however, that this large bucket was quite incapable of excavating the indurated material. It could not move sufficient to pay for its maintenance. It could excavate the soft material, but the hopper, the cutter and the vacuum method of transmission failed to transport the material with economy. It formed into balls and lumps in the hopper and did not flow with the water as suspended material but rather as small separate masses carried through the pipes. The steam capacity, though large, was not sufficient to operate the vacuums alternately with continuity, and thus, instead of a steady flow through the discharge pipe, there was an intermittent series of impulses. The attempt to use these vacuum orange-peel dredgers for this excavation was abandoned, and one of them was rebuilt as the centrifugal pump dredger with 18-in. discharge pipe, described above. The other vacuum dredger was sent to the vicinity of New York, and is working on material quite different from any encountered in the canal.

No ladder of continuous scoop dredgers were used on this work. Experience on the St. Lawrence river not very far from this locality had shown good results from such dredgers, and it is regretted by the writer that the contractors did not place at least one such in operation.

SUMMARY OF RESULTS WITH DIFFERENT MACHINES.

Now let us summarize the statements above made:

The total amount excavated by dredgers in this canal was 1,436,000 cu. yds. There were in addition excavated by other means 4,433,000 cu. yds.

The vacuum pump dredgers with orange-peel buckets and pipe transmission lines were not serviceable in excavating and transmitting either the indurated or the softer material.

The centrifugal pump dredger excavating by revolving cutter to depths under water not exceeding 22 ft., lifting the material to a height of 30 ft. above water and depositing it through a pipe of 12 in. diameter, 1,200 ft. distant from the canal, could not excavate the indurated material but worked with success in the softer material. It excavated and deposited in three seasons 459,800 cu. yds. of this material at an average cost of 8,507 cents per cubic yard, this cost including labor, supplies, coal, repairs, renewals and care during the winter seasons.

The centrifugal pump dredger, generally similar to the one last mentioned but with a discharge pipe 18 in. in diameter, working in the softer material, excavated and deposited in two seasons 290,780 cu. yds. at an average cost of 9.399 cents per cubic yard. The centrifugal pump dredgers worked twenty-two hours of each twenty-four hours.

The dipper dredgers excavated during three seasons 525,306 cu. yds. This was indurated material. It was deposited in scows and towed by tugs and deposited in water about 5,500 ft. from the dredgers. One of these dredgers with a dipper of 2½ cu. yds. capacity, working ten hours each day and excavating to a depth of 20 ft. below the water surface, lifted and delivered 138,001 cu. yds. in 183 working days of ten hours, at an average cost of 8.004 cents per cubic yard, this cost including labor, supplies, coal, repairs, renewals and care in winter, for the dredger, scows and tug for towing.

Coal is included in these statements at a cost of $3 per ton; the modification for a different price of coal can be readily found.

In latitudes where dredging can be done during all seasons of the year the modification required can be easily made from the data above given; the cost per unit will be reduced provided also there is continuous work for the dredger throughout the year.

MANCHESTER OIL INDUSTRY.

London, Sept. 20.—American ship builders are naturally interested in the building of ships specially put together for the transport of petroleum. The latest of its kind is the steamship Pectan, built by William Gray & Co. of West Hartlepool, to the order of M. Samuel & Co., for the Shell Transportation & Trading Co. The vessel is the largest bulk oil steamer afloat, and is the ninth built by Gray & Co. for the Shell company. Her dimensions are 483 ft. over all, extreme breadth 55 ft. and depth 34 ft.; the registered tonnage is 7,300 tons, deadweight capacity 10,100 tons, and capacity for measurement of goods 14,000 tons. The bunker spaces are constructed to carry either coal or oil for fuel, and there are eighteen separate cargo compartments in addition to cofferdams and other spaces. Oil pipes, fitted with controlling valves, are carried throughout the oil compartments, and shore connections fitted to each side amidships and over the stern. Two pumps are placed in the pump room capable of discharging 300 tons of oil per hour. The Shell company is certainly a wonderfully go-ahead concern. In ten years it has brought together thirty-eight vessels with a deadweight capacity of 152,000 tons, and they are now the fourth largest company sending ships through the Suez canal. The enterprise has been built up without a shilling subsidy from any government. The board of trade has now passed a vessel using liquid fuel for passenger traffic, and this is a most important step in advance; it is indeed a landmark in the progress of this special kind of enterprise. At the dinner celebrating the launch of this vessel Mr. Melrose of the admiralty said they had not adopted liquid fuel for consumption in the British fleet at present, but he was free to confess that the time was not far distant when the strategical value of it alone would make it the fuel for war service. The present difficulty was the price. This gentleman is by way of being a prophet, for he told the company that the time would come when the British people would recognize that there would be a clear and tangible return for any money outlay upon liquid fuel.

MANCHESTER AND OIL IMPORTS.

Mention of the transit of petroleum reminds me of a point I did not sufficiently develop last week in my comments upon the port of Manchester. With the single exception of London, which remains without a British rival in the magnitude of its petroleum imports, Manchester has now a larger share of the oil trade than any other port in the United Kingdom. Liverpool, which follows it closely, is falling behind on account of its greater distance from the most important centers of consumption, and because the Mersey docks and harbor board does not permit the election of oil storage tanks on the Liverpool side of the river. For these reasons petroleum companies seeking sites for storage and distributing plants in Lancashire have recognized that on the banks of the Manchester ship-canal, where there is plenty of cheap land and direct communication with the railway and inland canal systems of the north and midlands, the trade can be conducted with the greatest economy and advantage. Since 1897, when the first petroleum tanks were erected by a Russian company, there has been a rapid and almost uninterrupted increase in the annual imports of oil to Manchester. Before that date all the oil imported was in barrels, but although the barrel trade has been maintained and even increased, it is in the imports by tank steamers that the most remarkable development has taken place. Imports in barrels have averaged about 25,000 tons annually for five years past. The bulk imports in round numbers aggregated 21,000 tons in 1897; 57,000 tons in 1898; 90,000 tons in 1899; 101,000 tons in 1900, and 81,000 tons in 1901. The imports during the first eight months of the current year were at the rate of nearly 9,400 tons a month, or 112,400 tons per annum.

All the oil storage tanks along the canal, with the exception of the Manchester corporation gas committee's depot near Mode Wheel locks, have been erected by private enterprise, and are privately owned. At Eccles the Consolidated Petroleum Co., (which represents the Rothschild Russian interests) has five tanks, with a capacity of 22,000 tons, or about 5,750,000 gallons. The twelve tanks at Mode Wheel, owned by the Anglo-American Oil

Co., (representing the Rockefeller interests) the Liverpool Storage Co., and the Manchester gas committee, have an aggregate capacity of 25,000 tons, or nearly 6,500,000 gallons. At each of these wharves the oil is pumped directly from the tank steamers through pipe lines into the storage tanks, whence it can be distributed either in barrels or in bulk by means of tank barges, road tanks, or railway tank wagons. In addition to these depots, tanks are now being erected beside the Bridgewater canal at the Barton end of Trafford park by the Pure Oil Co., Ltd., a co-operative concern representing a number of the smaller American producers. One tank, with a capacity of 5,000 tons (say 1,250,000 gallons), is already up, and another is, I understand, to be built beside it. Incoming steamers will be berthed at a wharf in the rock-cutting above Barton bridge, whence a pipe line will convey the oil to the tanks, and to facilitate the distribution by road tank wagons in the Manchester district another pipe line has been laid from the Barton tanks across the park to a point near the junction of Trafford Wharf road with Trafford road. This company has on order a number of railway tank cars, and intends to make use of tank barges also for sending oil to Bolton, Bury, Rochdale and other interior towns. In the same part of Trafford wharf a site has been taken by the Caucasian Petroleum Export Co., Ltd., of London, for another oil tank installation, and yet another company has just purchased a site in the same neighborhood for an oil tank capable of holding 8,000 tons of petroleum, or about 2,000,000 gallons. This tank, the largest in the kingdom, if not the largest in the world, will be used for the storage of Texas oil cargoes. Two other companies are negotiating for oil tank sites in Trafford park. All these new enterprises are an unmistakable sign that in the near future Manchester will have a still larger share of this increasingly important trade.

MANCHESTER LINERS AND AMERICAN COMPETITION.

I referred last week to the formation of the Manchester Liners Co., Ltd., of which Sir Christopher Furness, M. P., is chairman. They have declared a dividend of 5 per cent. on the ordinary shares, but the profits show a very considerable falling off. Two years ago they were £78,452, a year ago they reached £97,523, and this year only £51,578. Still, last year was one of great depression in the Atlantic trade, and the dividend must pass as satisfactory in the circumstances. As is well known, the Manchester Liners concern themselves almost entirely in the American trade. During the past twelve months they carried to and from the port of Manchester and Canada a total cargo of 144,744 tons, and from Canada to Manchester 11,459 head of cattle and 7,190 sheep. The loss in transit among the cattle was sixteen head, or 14 per cent. In addition to the Canadian service they have commenced a service with the port of Philadelphia. From Philadelphia to Manchester they have carried 59,077 tons and 2,090 head of cattle, with no loss. The fleet during the year steamed 401,000 miles without any loss of life. The number of miles steamed in the previous year was 353,000. The fleet has been increased during the year by two steamers, and today their deadweight carrying capacity is 75,759 tons.

COALING MACHINERY.

Lieut. Charles L. Poor in the Naval Annual.

The Spanish war showed the necessity of devising some means whereby vessels might be coaled at sea or during blockade. The question had been attacked prior to this, with but little success, both by Great Britain and France. Nearly twelve years ago it was attempted and accomplished in mid-Atlantic by Admiral Sir Michael Culme Seymour. The ships were, however, stationary. Since then the French have tried the same thing under way. The first coaling at sea took place in the middle of August, 1890, some 500 miles south of the Azores, and 1,000 or more from the African coast, with 2,000 fathoms under the ship's bottoms. Thus all the conditions of being at sea were amply fulfilled. The ships that coaled were Camperdown, Ajax, Audacious, Iron Duke, Northampton, Immortalite, Aurora, Neptune, Conqueror, and Minotaur. They took varying amounts—in all cases the minimum necessary to take them back to Torbay, some 1,800 miles distant. One ship, the Howe, evaded coaling, and had to go into Vigo. The rest, though their captains protested strongly in several cases, took coal. There were three full colliers with the fleet, and each ship took an average of 350 tons at the usual harbor rate or nearly so. The sea was smooth to look at, but there was a heavy Atlantic swell. Each collier was lashed alongside a battleship, with thick fenders between. Toward the end of the operation the swell increased, and a considerable amount of "moral suasion" was required with at least one collier captain. The coal was taken in with derricks at the main deck ports. One or two ships had torpedo booms broken, and one collier sustained some dents in her sides, but no material damage was done. The ships, however, pitched somewhat, and the colliers, when they began to get light, pitched rather violently. I have dealt with this sea-coaling at some length, because so far as we know, it was the first effort ever made in this direction. Its strategical value was, or rather might have been, great, the fleet that coaled being an evading one; and had not the Howe put into Vigo to coal, it would, thanks to this coaling, have completely achieved its object—the destruction of a mythical trade without its whereabouts being known to an enemy who trusted to discover it by its having to go and coal. French experiments have gone on intermittently ever since 1890 with vessels under way, the collier being lashed securely to the ship, and then the latter steams ahead against the wind generally. It is claimed that ten knots has been reached in some of the trials, though this was necessarily in smooth weather, and it is even doubtful if this speed was reached. Use was made of Temperley transporters in these experiments.

The experiences of the Spanish war gave a great impetus to the solution of this problem, and recently the Russian and British navies have been experimenting with systems for coaling at sea. The Russian battleship Retvizan has been fitted with a Lidgerwood-Miller cable way. The traveler is operated by portable electric winches, which may be transported about the deck to positions favorable for working the cableway at sea. In addition, there is a hoisting device for taking on coal from colliers alongside in harbor. So equipped, the Retvizan may either tow or be towed by the collier. The British admiralty has been carrying on a series of experiments with the Temperley-Miller cableway, originally devised and successfully operated by Mr. Spencer Miller. He co-operated with Mr. Temperley, whose transporters are in general use in the British navy for coaling purposes, with the result that with improved appliances the problem appears to be near solution. The collier Muriel, which was sent to Portsmouth last July, was fitted with a large square mast, from the top of which a cableway extends to the quarterdeck of the ship to be coaled. For the purpose of the experiments, the Trafalgar, port guard ship at Portsmouth, was supplied with the necessary gear, and after several preliminary trials of an initial character, the Trafalgar put to sea towing the Muriel, whose engines were so slowed down that they did not give the ship steerage way. The Trafalgar then steamed ahead to wind at a speed varying from 8 to 10 knots, but from time to time one ship or the other sheered off a straight course and so reduced speed of coaling. The Trafalgar, having with two hawsers taken the Muriel in tow, the main cable was hauled on board the Trafalgar and made fast to her mainmast, about 10 ft. below the fighting top. The tail block, through which the traveling line passed, was sent to the Trafalgar along the main cable and made fast about 4 ft. below the main cable on the Trafalgar's quarterdeck, about 100 ft. abaft the mainmast. A guide post was erected, through which both these ropes passed and were so adjusted that, controlled by fair leads, they could slide up and down a distance of about 30 ft. Parenthetically it may be mentioned that any war ship supplied with the guide post as tried in the Trafalgar can get into communication with the collier at sea, and there is no need for boats or other laborious methods of conveying cables from ship to ship. As soon as the ropes had been made fast, coaling began, and six bags of coal each containing two hundredweight, were sent from the deck of the collier to the masthead by means of a lift working on rails on the side of the mast, and were then transferred to a traveler. The traveler containing the six bags of coal was then drawn across the battleship by a steel wire rope, which was coiled in by an engine. On reaching and striking the tail block in the Trafalgar the load was released and fell on the deck of the battleship. The empty trawler was then drawn back to the collier by another wire rope, worked by another engine, and at the beginning of the return journey the fair leads were hoisted to the top of the guidepost by the upward strain of the main cable and secured in this position. When the traveler approached the guide post on its next journey the fair leads were released and the load gradually reached the deck of the battleship.

Instead of using a sea anchor to keep an equal strain on the main cable between the vessels, as in former experiments, the same result was ingeniously accomplished by the use of a main cable tension engine which automatically keeps the cable taut while permitting its length to vary. This engine has two 13 by 13-inch steam cylinders, and is geared to a slipping drum. The engine turns in the same direction all the time, and the slipping drum is given a definite power of about 5 tons by the slip of its friction heads. Hence the drum maintains a constant pull on the main cable, revolving one way and then the other as the movement of the ship requires greater or less length of cable.

The two ships were 350 ft. apart, measured from the bow of the Muriel to the stern of the Trafalgar, and a steady head to wind course was pursued to prevent the collier from drifting on to the battleship. The operation lasted 2 hours and 55 minutes, and in this time 89.8 tons of coal, or an average of 30.8 tons an hour, was transferred from the collier to the battleship. The quickest run was 47 seconds, or an average of 46 tons an hour, and it is believed that with further experience this rate of coaling at sea can be maintained. The initial experiments were all carried out alongside the dock yard, and the last trial took place in favorable weather at sea, but it is expected that the next trial will be conducted in bad weather at sea, in order to give the apparatus a complete test before it is finally adopted in the service. At the trial, which was intended to demonstrate the practicability of the scheme, only six bags of coal were carried at each journey, but there is no reason why eight bags should not be carried, thus adding 25 per cent. to the speed of coaling.

A four-masted wooden schooner, the Samuel W. Hathaway, was launched from the yard of E. & I. K. Stetson, Bangor, Me., on Thursday of this week.

AMERICAN SHIP BUILDING CO.

Annual meeting of the prosperous lake organization—Surplus of $3,000,000 —Dividend of 4 per cent annually on common stock.

Aside from the announcement that it was decided at the annual meeting of the American Ship Building Co. in Jersey City, Wednesday, to begin, Dec. 1, the payment of 1 per cent, quarterly dividends on the common stock, there is much of interest in the report submitted by President W. L. Brown regarding the favorable condition of the company, physically and financially. In view of the surplus which the company has accumulated in the three years that has elapsed since its organization, it is quite reasonable to expect that the common stock dividend will be permanent. Another dividend on the preferred stock, which has had 1¾ per cent. quarterly since organization, is to be paid on the 15th inst.

The report of President Brown was, of course, the feature of the meeting. The financial part of it had been carefully guarded all through the periods of advances in the value of the company's stock during two or three months past and in fact up to the reading of it at the annual meeting. It shows surplus earnings for the year ended June 30 last of $1,184,257.52; this after paying the 7 per cent. preferred dividend of $553,000, in addition to charging $420,293.55 to depreciation, putting aside $200,000 for improvements at Detroit and other places, and reserving $150,000 for the payment of a purchase mortgage on the Buffalo plant, thus freeing all property interests from mortgage or other incumbrances. The amount charged to depreciation last year was $271,904. In the first fourteen months of the company's existence ended June 30, 1900, the surplus was $568,665.85; in the next twelve months, ended June 30, 1901, it was $1,173,637.67; and in the twelve months ended June 30, 1902, it was $1,184 257.52; so that the total now is $2,926,561.04. About $300,000 is all that is required to pay a 4 per cent. common dividend, and the company has just entered upon a year that will probably prove more prosperous than any of its predecessors, in view of the very large amount of orders on hand.

The condensed general balance sheet from the report of Mr. R. C. Wetmore, treasurer, from which the foregoing figures were taken and which was submitted with President Brown's report, is as follows:

RESOURCES.

Plants and property		$14,993,297 20
Additions and improvements to plants during year		190,414 12
Material on hand (market value)		640,559 54
Work under construction (balance due us)		1 076,728 02
Accounts and bills receivable, and cash		3,258,887 90
		$20,159,886 78

LIABILITIES.

Capital stock, preferred			$ 7,900,000 00
Capital stock, common			7,600,000 00
Accounts payable			883,325 74
Bills payable (paid in July)			500,000 00
Reserve for maintenance			200,000 00
Reserve for retirement Buffalo mortgage			150,000 00
Earnings		$2,507,551 07	
Less dividends paid, 7 per cent. on preferred.	$ 553,000 00		
Less depreciation and maintenance	420,293 55		
Less reserve for maintenance	200,000 00		
Less reserve for Buffalo mortgage	150,000 00	—1,323,293 55	
Undivided profits for year ending June 30, 1902		$1,184,257 52	
Undivided profits June 30, 1901		1,742,303 52	
Undivided profits or surplus June 30, 1902			2,926,561 04
			$20,159,886 78

DIRECTORS AND OFFICERS.

The board of directors and officers elected to serve for the coming year are:

Board of directors—Wm. L. Brown, H. H. Porter, Jr, of Chicago; Robert Wallace, H. M. Hanna, Robt. L. Ireland, James C. Wallace, L. C. Hanna, Luther Allen of Cleveland; Alexander McVittie, W. C. McMillan of Detroit; J. A. McGean of New York; L. M. Bowers of Binghamton, N. Y.; A. B. Wolvin of Duluth; Andrew M. Joys of Milwaukee; W. T. Coleman Carpenter of East Orange, N. J.

EXECUTIVE COMMITTEE

Executive committee—Luther Allen, William L. Brown, A. B. Wolvin, L. M. Bowers, Robert L. Ireland, Alexander McVittie, James C. Wallace.

Officers—William L. Brown, president; Robert L. Ireland, vice-president; Russell C. Wetmore, secretary and treasurer; James C. Wallace, general manager; James H. Hoyt, general counsel.

Referring to the condition of the company's property Mr. Brown says that during the year the physical condition of each plant has been kept to the highest standard of efficiency as far as possible, the expense incident to this having been charged to operating expense. It has been found necessary to enlarge the foundry and pattern shops at Detroit, to erect some new buildings at West Superior, to make some alterations and repairs at Buffalo, and to add some new tools and machinery at several of the plants. This work is now in progress and to pay for it, a special sum of $200,000 has been set apart as already noted.

VESSELS BUILT AND UNDER CONSTRUCTION.

The president's report shows that during the year ended June 30, 1902, the company built at its several plants forty-one vessels of 198,500 net tons capacity on 18 ft. draught, and that 30 vessels of 139,000 tons capacity were under construction at the several works on June 30. The company has even more vessels under construction now. They can not in fact take orders now for delivery earlier than November of next year. The table dealing with vessels built during the year ended June 30 last and with work under construction on that date is as follows:

PLANTS.	Vessels built.	Carrying capacity, net tons.	Vessels under construction.	Carrying capacity, net tons.
Detroit	8	30,000	5	19.000
Lorain	9	45,000	6	32,000
Cleveland	6	30,000	3	12,000
Bay City	3	15,000	3	18,000
Chicago	7	39,000	6	22,000
W. Superior	4	21,500	5	28,000
Buffalo	4	18,000	2	7,000
Total	41	198,500	30	139,000

"The construction during the year," says Mr. Brown, "has comprised many kinds, ranging from the standard bulk and package freight carriers, for both lake and salt water traffic, to the most modern and highest type of passenger steamers, the various plants of the company demonstrating full ability to build and equip all classes and types of the highest class and best construction. The annual increase in lake traffic makes it fair to assume that there is likely to be continued construction and gradual replacement of out-of-date tonnage and hence a fair future business in this line of work for the company."

PROPERTY OF THE COMPANY.

President Brown's report also shows property owned and controlled by the company as follows:

At Cleveland—Construction yard, boiler shops, machine shops, three dry docks, foundry.

At Lorain—Construction yard, machine shop, one dry dock.

At Detroit—Machine shops, brass works, boiler shops, three dry docks, foundry.

At Wyandotte—Construction yard, machine shops.

At West Superior—Construction yard, machine shop, two dry docks.

At Milwaukee—Machine shop, two dry docks.

At Chicago—Construction yard, machine shop, one dry dock.

At Buffalo—Construction yard, machine shop, four dry docks.

At West Bay City—Construction yard, machine shop.

The transfer agent of the company is the Corporation Trust Co. of New Jersey, 135 Broadway, New York; registrar of stock, Central Trust Co. of New York; general offices, Cleveland.

While no announcement has been made it is more than likely that the state department has selected the men who are to serve upon the commission which is to investigate the changes of levels of the great lakes, to consider the advisability of the construction of a dam at the foot of Lake Erie and to ascertain the real effects of the diversion of the waters of the lakes from their natural channels. Assistant Secretary of State Adee has invited the Canadian government, through the British embassy at Washington, to select commissioners to act with the American commissioners, whose names will probably not be announced until the Canadian government is heard from.

Another dividend of 5 per cent., amounting to $10,000,000 has been sent by J. P. Morgan & Co. to the members of the syndicate which underwrote the stock of the United States Steel Corporation. The syndicate pledged itself for $200,000,000 but only $25,000,000 in cash was advanced which was subsequently returned. The profits to date are $40,000,000 or 160 per cent. There probably has never been in the annals of commercial history a more profitable venture than this.

What an Enlarged Erie Canal Means to Farmers and Manufacturers.

The enlargement of the Erie canal is a subject of vital importance to the commerce of the great lakes. Canals, which were once the favorite mode of communication, have been almost obliterated by the development of the railway. Yet the canal affords a cheap means of transportation, and where time is not an object, an especially satisfactory one. In the movement of bulk freight on the great lakes, and especially grain, the Erie canal could play an important part. Its improvement would serve to prevent a great deal of grain going to the seaboard via the St. Lawrence river, and it would unquestionably divert to New York, inland shipments which are at present seeking oversea carriage from southern ports. In other words the improvement of the Erie canal would stimulate the lake trade. Mr. Gustav H. Schwab, manager of the North German Lloyd Steamship Co., has just written an article for American Industries (which is the new title of American Trade, the paper of the Manufacturers' Association) upon the meaning of an enlarged Erie canal to the farmer and manufacturer. As it is of equal interest to lake commerce it is herewith reproduced, though his views are not altogether endorsed. For instance the Erie canal will never enable New York to outstrip Pittsburg or any point on the South shore of Lake Erie as an iron making point. Mr. Schwab says:

"The transportation question is a most vital one for the agricultural as well as the industrial interests of our country .Neither the farmer nor the manufacturer can prosper unless he can reach the markets with his products, and he will not be successful if he is obliged to restrict the sale of his goods to his immediate neighborhood. In an enlarged sense this holds good with the whole country. We have long reached that point in our development where the markets of this country alone do not suffice us and our agricultural as well as our industrial products must seek foreign markets. If rates of transportation are high and means of communication inadequate the interchange of goods is blocked and commerce is rendered impossible. It is therefore of the first and most transcendent importance to all producers that rates of transportation throughout this country should be so placed that the natural advantages enjoyed by our agricultural and industrial producers may not fail for lack of markets as well in this country as abroad.

"Railroad transportation has shown marvelous advances in the course of the last thirty years. Curves have been eliminated, grades have been reduced, the weight of rails have been increased, roadways have been improved, locomotives and cars have been enlarged, and the result is that railroad transportation has now attained a degree of perfection not dreamed of thirty years ago. Rates of transportation on the rail as a consequence of all these improvements have been materially reduced and speed increased. Turn to ocean transportation, the development of which is equally interesting and instructive. The most prominent fact that is called to our attention in this connection is the great increase in the size and carrying capacity of ocean vessels, which, accompanied by constant improvements in the application of motive power to their propulsion, has rendered it possible very materially to reduce the cost of transportation per ton of cargo moved. Thirty years ago the largest steamship employed in the ocean carrying trade between New York and Europe measured 3,989 tons gross register. At the present date twenty steamships over 10,000 and up to 13,797 tons gross register, carrying from 7,500 to 12,200 tons deadweight cargo, run in regular lines between New York and Europe, leaving out of account the large fleet of vessels under 10,000 tons. To accommodate these enormous freight carriers, the largest of which now draw 33 ft. and over, a greater depth of water in the channels leading into and out of the harbor of New York has been called for. These demands of commerce have been most liberally met by the National government from time to time, and as the channels were increased in depth the number of large freight carriers grew. To illustrate the adaptation of commerce to the depth of the channels, compare the years 1870, 1880 and 1890. In 1870 the minimum depth of water in the channels of New York harbor, at mean low tide, was 23 ft., and the maximum draught of vessels at that time was 22 ft. In 1880 the depth of water in the channels had been increased to 24 ft., and the deepest draught of vessels was then 23 ft. During the following ten years the successful efforts of the government resulted in a depth of 30 ft. in all channels, permitting the increase in the size and carrying capacity of the freight carriers that have been constructed of late years. The increasing demands of the foreign trade of New York have resulted in the provision by the National government for an improved and straightened channel to the sea of 40 ft. in depth and 2,000 ft. in width, work on which is now under way.

"The great benefits conferred upon the western producer by thus enabling him, through the medium of cheapened transportation to the markets of Europe, to compete with South America, Australia and India will be realized on comparing the average rates of freight from New York to one of the continental ports of Europe as they prevailed in the years 1870, 1880, 1885, 1890, 1895 and 1900:

	1870	1880	1885	1890	1895	1900
Grain, per 100 lbs	$0.38	$0.30	$0.15	$0.08½	$0.08	$0.12
Provisions, per 100 lbs	.50	.36	.22	.21	.20	.20
Cotton, per 100 lbs	.80	.50	.37	.35	.25	.27
Tobacco, per hhd	10.00	7.80	6.60	6.00	6.00	6.00
Tobacco, per case	3.00	2.85	1.68	1.35	1.20	1.35
Measurement goods, cbf	.24	.20	.15	.13½	.11	.09½

"These figures, although occasionally showing a temporary increase, illustrate the general decline of ocean freight rates rendered possible by improvements in the vehicles of transportation. The average gross earnings of freight steamers with cargo from New York to European ports during the last five years, since 1895, show a rate of about seven-tenths of a mill per ton mile.

"Liverpool grain rates are generally considered the standard. Let us therefore compare the average rates of freight on grain from New York to Liverpool during the period from 1873 to the present year. The average rate per bushel in 1873 was 21 cents, from which figure there was a steady decline, with some slight recoveries, until, in the third quarter of 1894, the rate reached the abnormally low figure of 2½ cents, or twenty-eight one-hundredths of a mill per ton mile from New York to Liverpool. Since that year rates have gradually recovered, until at the end of 1899 the rate on grain to Liverpool was quoted at 6 cents per bushel, equal to sixty-seven one-hundredths of a mill per ton mile. The average rate of the last six years for grain from New York to Liverpool was 6.055 cents per bushel, equal to 672-1,000 of a mill per ton mile.

"After considering rail transportation and ocean transportation, turn to the commerce of the great lakes. Here we find the same phenomena that we observe in ocean traffic It is the same story of the increased size of lake vessels, the deepening of harbors and channels to accommodate them, and the radical reduction of rates of freight on their cargoes which these improvements rendered possible. To this should be added the extensive improvements in the facilities for loading and unloading, that contribute to a large degree toward the lessening of the cost of transportation. The freight tonnage moved through the Detroit river, which was 9,000,000 tons in 1873, grew to 40,067,380 tons in 1898, and the cost of transportation on the lakes has been reduced to such an extent that the rate per bushel of grain, which was 5¾ cents in 1880, was in 1898, 1.55 cents, equal to fifty-eight one-hundredths of a mill per ton mile for the distance by lake from Chicago to Buffalo.

"The iron ore shipments by lake from Lake Superior points have grown from 3,493,186 tons in 1886 to over 12,000,000 in 1897 and over 20,000,000 tons in 1901, and the freight rate on ore has followed the same downward course as wheat. The entire quantity of Lake Superior iron ore, estimated at over 12,000,000 tons, that is now used at Pittsburg, is brought by lake to Lake Erie ports. Ore was carried in the year 1897, from the head of Lake Superior to the lower lake ports, a distance of 889 miles, for 50 cents per gross ton, which is equivalent to a ton mile charge of but fifty-six one-hundredths of a mill.

"Contrast with the improved conditions of transportation on the rail, on the ocean and on the great lakes, the economic condition in which the Erie canal now finds itself. Since the year 1862 no comprehensive enlargement of the Erie canal has been carried out, and as an instrument of transportation, it has remained at a standstill these last forty years, a period during which the most far-reaching improvements have been adopted and the most dazzling progress has been made by the railroad, by the ocean waterway and by lake transportation. The permissible length of boats on the canal in its present innocuous condition is about 100 ft., their width 17½ ft. and their draught 6 ft. The maximum load of a boat of these dimensions is 240 tons or 8,000 bus. of wheat, and the transportation cost per ton mile is estimated at a little less than 2 mills. Owing to the antiquated condition of the canal and its locks, not more than seven trips can be made per annum. Under these conditions it is no wonder that the transportation business between Buffalo and New York, which is the link connecting the great lakes, on which products of the northwest are brought to Buffalo, with the seaboard where cheap transportation awaits these products, has thus almost wholly passed into the hands of the railroads.

"In the management of their business the great railroads of the country have found it necessary to effect certain combinations and arrangements whereby the business might be apportioned among the individual roads. By these combinations, in 1877, certain differential rates were fixed as against New York, to enable the southern ports to obtain business, as an offset to the advantages that New York was supposed to possess in lower ocean rates. Since that time the ocean rate has been more or less equalized, but the discrimination against New York has remained

unchanged and will certainly never be removed as long as the interests of the railroads oblige them to maintain these traffic arrangements.

"The facts stated above have shown beyond the possibility of doubt that water transportation always has been, is, and probably will be for an indefinite period of time the cheapest form of transportation known to man. As against an average rate of transportation on lake and on ocean in late years equal to from fifty to seventy one-hundredths of a mill per ton mile, the lowest rate regarded by railroads as practicable for a rail rate is 3 mills per ton mile. The Erie canal, as it exists to-day, is not in a condition in which it can successfully compete with the railroads and yet it is a fact that during the canal season the railroads are obliged to reduce their rates, raising them again at the close of canal navigation, to be again reduced on the re-opening of the canal. The freight rate on wheat from Buffalo to New York by rail from January 1 to March 31, 1901, and from Nov. 16 to Dec. 1, 1901, was 4½ cents per bushel, whereas during the period from June 1 to July 31, the rate was 3½ cents per bushel; from Aug. 1 to Sept. 30, 3¾ cents per bushel, and from Oct. 1 to Nov. 15, 4¼ cents per bushel, the rate by canal during the month of May having been 3.43 cents per bushel; in June, July and August 3.25 cents per bushel; in September 3.35 cents per bushel; in October 4 cents per bushel and in November 4.12 cents per bushel. The fact is therefore entirely clear to the business man that the Erie canal even in its present decrepit and antiquated condition is a regulator of freights and therefore is indispensable as a protector of all the interests that are interested in securing cheap transportation. The committee on internal trade and improvements of the Chamber of Commerce of the state of New York, in their report dated Feb. 1, 1902, to the chamber make the following statement:

"'The cheaper route between two points is the criterion which determines the rate of all competing lines. The canal and lake rate is the basis upon which all rail rates east of the Mississippi and north of the Ohio are predicted and determined, according to the testimony of railroad officials themselves. It follows that all persons throughout this state shipping or receiving freight by rail have their rate regulated and cheapened by the canal, and are therefore, interested in, and profit by its maintenance. It necessarily follows that consumers are equally interested in the maintenance of the canal. Thirty years ago the capacity of a canal boat plying the Erie canal was 220 tons; to-day it is about 240 tons, or 8,000 bus. of wheat. The maximum railroad train capacity thirty years ago was about 300 tons, or 10,000 bus. of wheat; to-day, with improved roadbed, heavy steel rails, enlarged cars and Mogul engines, the maximum railroad train capacity is 2,700 tons, or 90,000 bus. of wheat. By increasing the capacity of our canals commensurate with the improvements in railroad service, it is within the power of the state of New York to retain and perpetuate her supremacy in trade and commerce. This remedy is within her own control, and in the judgment of your committee it is the only remedy at hand.'

"The New York commerce commission appointed by Gov. Black in 1898, in their instructive report to the governor, after referring to the enormous development of the manufacturing interests of New York, Brooklyn, and Long Island city, using raw material valued at $527,678,152, producing finished articles worth $1,062,667,094, and employing 468,274 persons, to whom were paid $298,415,418 in 1890, continue as follows:

"' It is worth while to consider these establishments, with their enormous capital and their nearly half a million of skilled and highly paid mechanics, with reference to their consumption of vast quantities of raw material, a considerable portion of which originates in the west. It will then be apparent to what an extent these establishments are dependent upon the lowest possible transportation rates. Not only will reduced transportation charges upon the raw products increase the opportunities for enlarged manufacturing enterprises, but the greater area within which the finished products of the New York establishments can be profitably disposed of in competition with the products of establishments more favorably situated will additionally stimulate production. It must be obvious, therefore, that to the extent existing railroad differentials, adverse to New York, restrict the expansion of our manufacturing enterprises, to that extent commerce is also restricted.'

"But the manufacturing interests of New York city will not be the only interests to benefit by a modernized, improved and enlarged canal connecting the great lakes with the Hudson river. The possibilities of such a canal are immeasurably greater, for, by its agency in furnishing a low transportation rate for the raw material of iron ore, which is the basis of vast industries and for the conveyance of the finished product to tidewater at rates that no railroad in the present state of human knowledge could compete with, it will place the great state of New York from Buffalo to the City of New York in a position where it can successfully compete with other states so far pre-eminent in iron and steel production. It needs but a glance to enable the iron and steel manufacturer of New York city to realize the advantage he will gain through the agency of such a canal from Lake Erie to tidewater on the Hudson river as compared with the rail route from Pittsburg over the mountains to the seaboard. The very cheap transportation on such an improved waterway will be so much in favor of the New York manufacturer that he need fear no competition and can outdistance his Pennsylvania rival, whose only advantage will consist in his cheaper supply of coal, which item of advantage, however, will only amount to a fraction of the lower cost of the New York manufacturer.

"The example of other countries is most instructive in this connection. Mr. S. A. Thompson, in his interesting article, 'The Effect of Waterways Upon Railway Transportation,' in The Engineering Magazine of July last, quotes United States Consul General Mason in Berlin as follows:

"'German statesmanship was among the first to foresee that the time would come when, railways having reached their maximum extension and efficiency, there would remain a vast surplus of coarse, raw materials—coal, ores, timber, stone and crude metals—which could be economically carried long distances only by water transportation, and that in a fully developed national system the proper role of railroads would be to carry passengers, and the higher class of merchandise manufactured from the raw staples which the waterways had brought to their doors.'

"And the well-known French statesman M. de Freycinet, as follows:

"'It is conceded that waterways and railways are destined not to supplant but to supplement each other. Between the two there is a natural division of traffic. To the railroad goes the least burdensome traffic, which demands regularity and quick transit; to the waterways gravitate the heavy freights of small value, which can only be transported where freights are low. Waterways, by increasing traffic, are rather the auxiliaries than the competitors of railroads. In procuring for the manufacturer cheap transportation for coal and raw materials, they create freights whose subsequent transportation gives profit to the railroads.'

"Mr. Thompson shows most conclusively that the railroads are benefited by competing waterways. He makes the following statement:

"'While the controlling effect of competing waterways on railway rates has been generally recognized, another effect, of equal or greater importance, has been almost completely overlooked. For, paradoxical as it seems, waterways are not only the most powerful possible regulators of railway rates, but are also the most powerful possible promoters of the prosperity of railways with which they compete.'

"Mr. Thompson shows by publishing figures of railway earnings of Germany and France the growth of traffic on railways resulting from the improvement of competing waterways. The interests of the railroads and those of the waterways are, therefore, clearly not antagonistic, and all transportation interests as well as manufacturing and producing interests of every kind should join in combined effort to secure for the empire state and all the country the incalculable benefits that will flow from the construction of a modern waterway connecting the great lakes with the Hudson river."

LAKE FREIGHT PROSPECTS FOR 1903.

Duluth, Minn., Sept. 30.—It is currently reported in vessel circles here that officials of the Steel Corporation who have to do with lake transportation matters expect to pay more for ore carried another year than has been paid this season. The idea seems to be that there will be more of all commodities another year, and that so early an opening of navigation cannot be looked for; that the opening this year was at least a month ahead of the usual date and that a return to the average must be figured on. This alone would make a difference of 15 per cent. in the capacity of ships. Of course there will be vastly more grain from Chicago, for the corn movement this year has been almost nil and should be enormous another season. That there will be more ore is undoubtedly true if the prosperity of the country remains as it is now or suffers no serious set back. There may be more grain from the head of Lake Superior, though good authorities say even now, that there is not enough in the Dakotas and Minnesota to serve mills there and give a reasonable amount for farmers. But there will be a large amount for shipment from Canadian northwestern ports—twice as much as any preceding year without a doubt. Then there is the coal movement, which should be at least 1,000,000 tons more than it is liable to be this season. For while there has been a larger movement of bituminous coal than ever before it has been little, if any, in excess of the expansion of industries requiring soft coal, and has not taken the place of anthracite to any appreciable extent. There will be a shortage of bituminous as well as of anthracite next spring. One point of importance comes in here, and that is what may the northwest do in future after having been forced this year to try the experiment of Dakota lignite? All over the prairie region they will use lignite from the mines along the upper Missouri this winter, simply because they will have to. They have never made a fair experiment with lignite up to this time. If the results are what a great many well informed people think they will be, the future market for anthracite in the northwestern prairie region will be very small and this will have an effect on coal shipments up lakes. Lumber shipments will probably run along about the same next year as they have this.

It is reported on good authority that Mr. F. H. Clergue of Sault Ste. Marie will exercise the options he holds for the purchase of the various ships he has under contract for ore carry-

ing and possible purchase, and that his fleet will be considerably augmented.

The Collingwood Ship Building Co., says Capt. Alex. McDougall, recently ordered a large shipment of Scotch ship plates, being unable to get prompt delivery from American manufacturers These plates were laid down at Collingwood six weeks after the order was placed, which would indicate that the Englishmen have learned a thing or two as to promptness of their American cousins.

It is predicted that the business of the port of Superior for the year will amount to above $100,000,000 in value of products handled. The city administration has not come to any conclusion as to the proposed city dock, referred to in this correspondence several weeks ago. So far the matter has been in the hands of a local promotion club which will ask the inclusion in the tax levy of funds for the dock. The city is not inclined to look with favor on any proposition for an increase in the levy and may turn the whole matter down cold.

The steamer Sultana arrived at Duluth Saturday at 1:30 o'clock and cleared the harbor entrance at 6 o'clock the same afternoon with a full cargo of wheat. The Jas. H. Hoyt took on a load of 5,200 gross tons of ore at Ashland Saturday in sixty-eight minutes, and was at docks but ninety minutes. Twenty-two minutes of this time was occupied in shifting to the spouts.

SAULT STE. MARIE CELEBRATION.

A preliminary prospectus has been issued of the proposed celebration of the semi-centennial anniversary of the breaking of ground for the first canal at Sault Ste. Marie, Mich. The prospectus comes from Sault Ste Marie where the movement is now being agitated. A tentative program has also been prepared which embraces a reception to the president of the United States. the governor general of Canada, governors of lake states and provinces and other prominent officials with a military parade; the unveiling of suitable tablets with addresses and an inspection of the industrial works on both sides of the river. It is also intended to make as fine a marine display as possible. Michigan has now taken up the project in earnest and its legislature is to act upon it. The Ohio legislature, too, will be called upon to officially recognize the celebration. The argument contained in the prospectus in favor of the celebration is briefly as follows:

First—It occurs at a locality exhibiting the best practical illustration to be found on this planet of the enlargement of engineering ideas during the century. There is to be seen a canal lock built for the Lake Superior traffic in the eighteenth century, 40 ft. long by 8 ft. wide, 5 ft. lift and 5 ft. deep. Within a mile from it is located the latest example of the nineteenth century's expanded engineering ideas in a canal lock 800 ft. long, 100 ft. wide, 18 ft. lift, 21 ft. depth, operated by hydraulic power; also another a few rods distant from the one first mentioned, 900 ft. long, 60 ft. wide 18 ft. lift and 20 ft. deep over mitre sills, operated by electrical energy.

Second—It presents the most illustrious example on the globe of the beneficial results of the national fostering of peaceful pursuits by its citizens. With an expenditure of less than 10 per cent. of its outlay in one year of army and navy preparations for war exigencies the United States has, by its aid to the Lake Superior canal system, enabled a mining output which places it at the head of the world's industries in copper and iron, and instead of an importer, becoming an exporter of the products of these metals. The annual cost to it of providing free transit to 35,000,000 tons of merchantable property is less than that of maintaining one of its first-class war vessels or forts in peaceful desuetude during the same time.

Third—It commemorates the most praiseworthy instance of public-spirited citizenship occurring in connection with the public works of this country.

Fourth—It affords the most remarkable example of growth of local commerce yet recorded in the world's history. In 1853 all the traffic of Lake Superior was concentrated at Sault Ste. Marie, as no means of access then existed over land with the lake in any direction. At that period less than twenty horses sufficed to transfer over the existing plank road and tramway, around the south side of the falls, all freight and passengers during the seven months of navigation. Fifty years later 35,000,000 tons of freight with tens of thousands of passengers will have passed that "portage" in a single season. The nearest approach to this marine commerce development is at the Suez canal, near the junction of three continents, which has not exceeded 10,000,000 tons in twelve months (the last report showing 9,378,152 tons), and at the German canal which in 1901 passed 4,281,027 tons.

It is proposed to make the celebration as comprehensive as possible and invitations will be sent to the governors of all the lake states to participate.

Capt. William Cavers, a popular and well known lake master, died at his home in Buffalo last week. He had been identified with the lakes for a great many years. He sailed the steamer Pillsbury of the Sault line for a number of seasons but during the past nine years had been identified with the Shaw-Eddy line, sailing the steamers Selwyn Eddy, City of Bangor and Simon J. Murphy. He was in command of the Murphy when he was taken ill.

CANAL SITUATION IN NEW YORK.

Buffalo, Sept. 30.—Mixing canal matters up with state politics is some thing that the friends of canal enlargement do not really like to do, but the situation seems to demand it and there has been no hesitation on the part of the Buffalonians who really have work in them for the cause. For a considerable time there was a hope that the legislature would rise above mere politics and take a business view of the need of the state and the lake region, give up the effort to make political capital out of the poor canal and agree to stand for enlargement first and all the time. It was found, though, that such a step was too much to be expected and then the canal men turned politicians on their own account and went into the conventions this fall.

On the whole the Republican state convention did quite as well for the canal as it could be expected to do, but most of the friends of the movement came home dissatisfied with what had been secured, for it was confessed that a concession obtained with manifest reluctance cannot be depended on unless it is found that the other party is going to be hurt by an adherence to it. There is muttering in the canal ranks and if the Democratic utterance is considered the more sincere there will be a big canal vote thrown in that direction.

It has come to a pass that something must be done or drop the entire subject and it is at the same time discovered that the canal party is a strong one. The divisions on the subject in rural Chautauqua county, due without doubt to agitation from Buffalo, has already fairly unseated an assembly speaker, so that if he returns to Albany at all it will be with his wings clipped very seriously.

The time for work on canal lines is very propitious. There is less division among its friends than ever before. New York and Buffalo can be depended on to act as a unit and the ship canal ghost appears to be laid once for all. New York has joined with Buffalo in saying that a vessel suited for lake traffic is not suited for ocean traffic, not to mention any other difficulties, many of which are as dead against the idea as this one is. Nobody denies that the same vessel will do business in both fresh and salt water, but it will be found impossible, more even in the future than it has in the past, for the same vessel to compete with others built for either fresh or salt water without reference to the requirements of the other. We are not yet convinced that the successive efforts to carry the lakes down the St. Lawrence, even as far as Montreal, have demonstrated an ability to compete successfully with the routes that end with Lake Erie. Really it would be an advantage to the Erie canal cause if the St. Lawrence ventures should succeed, for in the event of losing the lead and that to a route in so many ways inferior to ours there would be too manifestly a flinging away of the lead to anyone who cared to grasp it, which is a proceeding that even careless New York state will hardly do yet a while.

Of course there can be but one view of the situation on the part of the lake vessel owner. The railroads, whether running eastward from Buffalo or any other present eastern terminus of a lake route, are in league with the eastern capitalists who are trying to drive the individual owner off the lakes. If these roads are not actually owned by these same capitalists they might as well be, so far as any quarter they are likely to give the single owner of lake property. With the Erie canal route gone the possibility of a solid combination would become a certainty at the leisure of the roads, but with an active canal this would be an impossibility. A cheap route to the sea and one out of corporation control would be assured and there would be an indefinite lease of life to the uncombined vessel owner. While the canal advocate is not really taking that side of the case into consideration he is aware of its significance and his agitation of the cause of the canal is such as to make him the solid ally of the free and unattached navigator of the lakes.

Never before has the canal party shown itself so powerful and it is felt that there is still any amount of reserve force in waiting if it be needed. As soon as the state is willing to exalt business above politics the matter will reach an easy solution.

JOHN CHAMBERLIN.

Capt. John Mitchell of Cleveland and his associates in the vessel business have for about four years past had a steel steamer or two constantly under construction in some one of the yards of the American Ship Building Co. The last of them was launched at Lorain on Saturday. Capt. Mitchell says he is through with new ships for a while. The latest vessel is named Moses Taylor. She is of the 6,000-ton kind, similar to the other big steamers of the Mitchell fleet. Capt. C. B. Galton, who holds first place among masters in the office of Mitchell & Co., and who has already brought out this season the steamers Gratwick and Gayley, will command the Taylor. She will be ready for service in about a month.

Mr. Charles Y. Dixon, assistant engineer at Amherstburg, writing to the Review, says that the device for transmitting automatically water-gauge signals on the Detroit river is an assured success, although some changes and improvements are now being made in it, intended mainly to reduce the cost of sending. It is intended to apply for a patent and the details will not be published until this has been done.

AROUND THE GREAT LAKES.

Myron is the name under which the steamer formerly known as the Mark Hopkins now sails.

Inland Lloyd's Register (October supplement) gives Pere Marquette car ferry No. 18, just completed at Cleveland, a value of $400,000 and A1 rating.

Construction has begun upon the ore dock at the steel plant, Sault Ste. Marie. The dock is to be built of steel and concrete. The bins will be of steel. Talbott & Co. are the contractors.

Capt. Geo. P. McKay of Cleveland, has been informed that the lighthouse board has authorized the establishment of gas buoys for Waverly shoal, Lake Erie, and for the middle Neebish channel in Hay lake.

Car ferry No. 18, building at Cleveland for the Pere Marquette railway, will go into service on Nov. 1. A schedule of three regular trips per day will then be established between Milwaukee and Ludington.

Capt. Martin, whose last command was the steamer R. S. Warner, and who has for several years past sailed vessels controlled in the office of M. A. Hanna & Co., Cleveland, died in Ashtabula on Sunday last of pneumonia.

Bids will be opened in Washington Oct. 6 for the construction of a life saving station at Buffalo. Capt. Edwin E. Chapman, superintendent of the tenth district, in which Buffalo is located, says the station will be a very fine one. The main building will be 80 by 50 ft.

William Henry Mack is the name selected for the steel freight steamer which the American company is building for the Mack estate of Cleveland. The selection is in memory of W. H. Mack, who was manager of vessels of the estate and who lost his life while looking after a wrecking expedition on the Massachusetts coast several months ago.

Capt. H. A. Stewart has been placed in command of the new Mitchell steamer Frank H. Goodyear. The Pullman car type of deckhouse located amidships on this steamer has been lettered "Buffalo and Susquehanna." Mr. Goodyear, for whom the vessel is named, owns the Buffalo & Susquehanna railway, and the odd deckhouse is a duplicate of his private car.

A dispatch from Negaunee says that there are now about 400 men steadily employed at the Negaunee mine. It is the intention to add to this force as rapidly as the men can be profitably employed. It is assumed that more ore will be taken from the workings during the coming twelve months than was raised during any similar period in the history of the mine. The mine passes to the Cleveland-Cliffs Iron Co. next September, so that the Steel Corporation has about eleven months left in which to operate it.

Maj. W. H. Bixby, United States engineer at Detroit, announces that within the next two weeks dredges will be placed at work digging out the shoal spots which have several times been reported on the east bank of the cut just below St. Clair Flats canal. This spot has caused considerable trouble during the season, the last vessels to strike being the barges Martha and Magna of the steel corporation fleet. The shoal spot directly in the channel of the St. Clair river abreast of the Sarnia ferry docks is giving considerable trouble to vessels at present.

City officials of Chicago have again tackled the tunnel question. River improvement must stop at 16 ft. draught until the street tunnels are lowered or done away with altogether. The city engineer calculates that to lower the tunnels would cost $520,000 at Washington street, $200,000 at Van Buren street and $300,000 at La Salle street. Mayor Harrison, after going over the extreme urgency of the case, said the tunnels, to his mind, can be lowered in only two ways—by the sanitary district or by money obtained from the water fund. He is opposed to the proposition of destroying the tunnels which is advocated by the drainage board.

The Cleveland-Cliffs Iron Co. has made another step in its onward policy. It has acquired what is known as Pendill's subdivision in the city of Negaunee, including the Lucy mine. The consideration is $85,000. The Lucy mine was opened in 1870 but has not been operated since 1898. It is credited with total shipments of 516,159 tons of ore. Under Cleveland-Cliffs management it is expected to develop into an important property. The South Arm Lumber Co. has also transferred to the Cleveland-Cliffs company the railroad right of way known as the upper line of the dead River railroad, upon which a road of standard gauge has been constructed. The consideration in this case is $20,000.

In dredging the channel near the south end of Bois Blanc island, Detroit river, a white sand stone has been found which has excited much interest among engineers. The material requires to be drilled and blasted before being removed, but when it is dredged it comes up in the shape of fine white sand. The area covered by this material is about 500 ft. by 250 ft., but the limit has not yet been reached. The formation appears to extend under Bois Blanc island. Several samples have been assayed and were found to be about 99 per cent. silica with small part of carbonate of lime and magnesia. The character of the surrounding material is limestone which merges into the sandstone without any perceptible break.

SCOTTISH SHIPBUILDING LETTER.

Glasgow, Sept. 20.—The outstanding feature in the trade situation is the continued, ever-increasing demand from the United States for pig iron and steel material. Several steamers have been chartered within the last week or two to load iron in the Tees, and also on the west coast, for your side. The orders recently received are mostly for steel-making iron, and contracts have been concluded for something like 30,000 tons Cleveland and Cumberland hematite for shipment up to November next. Tonnage has already been secured for a considerable portion of this at very low freights. The effect of the American demand and of the decline in the stocks in the warrant yards has been to raise the price of pig iron on our home consumers, even though coal is tending downwards. In return this advance in crude material would have been reflected in the prices of finished material, such as ship plates, but for the fact that German iron and steel are now being offered freely in our markets at low rates. It is said that German steel ship plates have been actually sold delivered in the north of England at 5s per ton under the price of local makers, but I cannot learn that any such sales have been effected here. The knowledge that Germany is an eager seller is enough to keep down quotations anyhow. Still, prices for material are so high that ship builders cannot quote low enough to tempt ship owners to place their specifications, except in the case of established lines, and particular services. in which the supply of tonnage must be kept up at any cost. Practically the cost of serviceable cargo boats of moderate speed is about 15 per cent. more than it was six years ago, yet owners who want to part with quite new and ready boats cannot find buyers at 20 or 25 per cent. reduction on cost. This is not surprising when the enormous volume of tonnage seeking employment is considered. For every boat he asks for, a charterer will have a dozen or a score thrust upon him. The steamers going out with pig iron from the Tees to Philadelphia are getting only 6s. per ton and to Baltimore 5s. 10½d. per ton freight. A new employment has sprung up of a remarkable character—for the conveyance of coal (anthracite) from Swansea to New York Several boats have been chartered for this phenomenal trade, and it is said that more are wanted. But at 5s. 6d. per ton freight, which is the rate paid for the Glencoe chartered last week, there can be no margin.

The subject of coaling at sea has been occupying the attention of the admiralty for some time past. They have now called for tenders for a type of ship which is new to the navy, described as "coal depots," with a capacity of no less than 12,000 tons. Their design is original. The hull is to be divded into two immense holds by an opening extending fore and aft from the double bottom to the deck. These holds are divided by a lower deck, which leaves a space of about 7 feet in height below it. All over this deck are shoots, and through these shoots the coal in the mainholds forces itself into bags fixed below them. When the bags are full they are carried bv an ingenious arrangement towards hoists in the central passage, and from the deck are loaded into the vessels alongside. Two ships can be coaled simultaneously by this method. The intention is to equip all the naval coaling-stations with ships of this type.

Orders for three of the nine torpedo-boat destroyers in the navy estimates for the current year, have now been placed, but none on the Clyde, as the builders here who might otherwise have undertaken this work are better occupied on cruisers and battleships. Two each are to be built by Laird of Birkenhead, Palmer of Jarrow-on-Tyne, Hawthorn, Leslie & Co. of Newcastle-on-Tyne, and Yarrow of London. The ninth will be built by Thornycroft of London. One of Hawthorn-Leslie's pair will be fitted with Parson's steam turbine machinery, similar to that in the Velox, which the admiralty recently purchased. The new torpedo boat destroyers will be much bigger than those now in the service, and will have a large forecastle to improve their seaworthiness. They will be of heavier scantlings, and will be less uncomfortable. The guaranteed speed is to be 25½ knots as compared with 30 knots in boats now in service, but this reduction of speed is nominal, for 25 knots will always be attainable by the new vessels, while even in moderate seas the existing vessels cannot do more than 24 knots or so.

MORGAN SHIPPING COMBINATION DISCUSSED.

When the British Association met in Glasgow last year Dr. Ginsberg addressed it on the subject of "Shipping Subsidies." This year he took for theme the "Shipping Combine." He maintains that the Morgan combine is an application of the American trust system to the exploitation of the sea-carrying trade. It involves of necessity a considerable dilution of the capital of the business it absorbs. Its success from a shareholder's point of view must, therefore involve either a raising of freights to make a due return on the larger capitalization, or a considerable economy in operation to make the net profit sufficient to give the proposed return. The first of these two alternatives would seem to involve the getting up of a monopoly, since the protectionist policy of the United States will not assist the promotion of the enterprise. The "through bill-of-lading" of which so much has been said in this connection, is not a new institution, and cannot for several reasons be pressed indefinitely. In the first place, its success would depend on practical control of the railways to the eastward. In the second place American pride in the restoration

of the influence of the stars and stripes on the sea, if not of its actual reappearance on ocean steamers, will not induce Americans to submit to large increases in the payments of carriage, since eventually in the open markets for produce the American shippers would feel the effects of such increase. A continued and appreciable increase in freights would depend on the establishment of a monopoly, since outside tonnage can be attracted to paying stations, though outside factories cannot be brought into competition with the land businesses. The success of the combine must, therefore, depend on large economies, and the promise that £2,500,000 sterling can be saved each year by centralization of control is subject to the comment that, though the expenses may be cut down, the incitement to individual effort is continuously lessened, whilst the beneficial effect of laying up redundant vessels in slack times is minimized by the fact that the large items of interest on cost, depreciation, and insurance run on against the laid-up ships, whilst the competitors of the combine will benefit by the removal of them from the competition. But whilst the promised economies in working may prove illusory or transitory, the additions to the capital on which any return to shareholders must be made are certain, large and abiding.

In this connection it may be noted that while the combine are to obtain all the new boats they need from Harland & Wolff, that firm does not depend on the combine for business. As a matter of fact, they are now very full of work not for the Morgan trust. They are building two twin-screw steamers for the P. & O. Co. and a Pacific mail boat bigger and faster than the four boats recently completed on the Clyde. They are also building what will be the biggest vessel in the Union-Castle fleet—an enlarged and improved Walmer Castle—and in dock completing is the Warren liner Iowa. The second-class cruiser Hermes is being fitted at their yard with new boilers and generally overhauled, and in the engine shop machinery for dock yard built ships—33,000 I. H. P. in all—is under construction. Engines of 15,000 I. H. P. are being made for the battleship Queen, and of 18,000 I. H. P. for the battleship King Edward VII. All this is British work. The combine work on hand includes the White Star liner launched the other day—the Cedric—and one now on the stocks A third, the Ionic, for the Australian service, is fitting out in the basin. There are also building an enlarged and improved Minnehaha for the Atlantic Transport Line, and a Dominion liner and two Leyland liners. This is a pretty full bill.

NEW VESSELS OF NORFOLK & NORTH AMERICA CO.

Mention has been made in previous letters of the two vessels, Orient Point and South Point, built here for the general trade between the United Kingdom and America conducted by the fine fleet of cargo steamers owned by the Norfolk & North America Steam Shipping Co., Ltd. During the past few years this company have been steadily adding to its fleet, and this week marked the trial trip of the second of the two vessels which Messrs. Napier & Miller, Yoker, have built for them. The Orient Point is a sister ship to the South Point, launched in June and like her was constructed under the supervision of Mr. W. Steele, the company's engineer. She was built to Lloyd's 100 A1 classification, under the three-deck rule, with forecastle, cellular double bottom, and fore-and-aft peak construction for ballast tanks. She is of 4,500 tons gross, with a deadweight capacity of about 7,000 tons, the other dimensions being: Length between perpendiculars, 385 ft.; breadth, 50 ft.; and depth, molded, 28 ft She is schooner-rigged, and has a poop bridge, six large hatches, and eight winches. The propelling machinery consists of triple-expansion engines of 2,500 I. H. P., the cylinders being 27, 43 and 72 in. respectively, with a stroke of 48 in. The boilers are single-ended and of extra large type, each being fitted with Howden's forced draft. The Orient Point did well on the measured mile, a speed of about 11½ knots being obtained.

Messrs. William Beardmore & Co., Glasgow, are about to adopt a new system of casting steel ingots at their Parkhead forge and armor plate works at Glasgow. This new system was described at the Iron and Steel Institute meetings at Dusseldorf. When molten metal has been poured into a mold, for armor plate as much as 50 or 60 tons, there is in the process of cooling a shrinkage which has an injurious effect on the metal, because there is at once formed a solid but extremely thin shell separated from contact with the inner walls of the mold owing to lateral contraction, and as this shell is filled with a heavy liquid the weight tends to burst the shell, producing cracks through which the molten metal finds a vent The new system allows pressure to be applied in the process of cooling. Hydraulic rams, working from the bottom of the mold, which is of conical form, raise the weak sheel so as to thrust it against the cool walls of the conical mold. The shell is thus forced upwards, closing in upon the central mass in proportion as shrinkage causes hollows to form. By hastening solidification the coarse crystalization with cleavages is counteracted, and the tendency of the carbon to accumulate in the upper part of the ingot is lessened. This is also effected by forcing the metal into intimate contact with the thick ingot mold, and especially by causing it to advance gradually towards the cold parts of the walls. This system, known as "compression by wire-drawing," will increase the productive capacity of the works by 25 per cent., will greatly improve the quality of the steel, and will reduce the proportion of useless metal known in steel works as "the header." From the economical point of view, it is computed that in the case of a compressed ingot of 20 tons yield there will be a saving in the selling price of the finished armor plate of £334 per 20-ton plate. In the case of crucible steel the total saving may be £7 10s. per ton of rough ingot metal. It will be seen that the new system means a great thing in the armor plate industry.

WAGES OF MARINE ENGINEERS

Three leading officials of the Marine Engineers' Beneficial Association—President Geo. Uhler, Vice-President Evans I. Jenkins and Secretary Geo. A. Grubb—met in Detroit, a few days ago, and agreed that the vessel classification of the present season, as well as the present season's scale of wages, should prevail for 1903. At first thought it would seem from this announcement that in all cases where employers and engineers are satisfied to renew present arrangements for another year contracts may be entered into at once. This is quite true in a great number of cases, but it is not possible that the announcement from Detroit will cause an immediate settlement of the engineer question for next year. It is hoped on both sides that the engineers may all be re-engaged even before they leave their vessels this fall, but the position of the Pittsburg Steamship Co. (Steel Corporation) tends to complicate matters, for the present at least. Their contracts of the present year are not in accordance with the association schedule. Chief engineers on the first-class vessels of the Corporation, for instance, are paid $1,500 a year, as against the association rate of $150 a month. Of course the engineers are not at work during the entire year and no doubt some of the men in the employ of the Corporation look upon their positions with more favor than they would other positions paying the monthly association rate. Then, too, the schedule, which did not apply strictly to the Corporation fleet last year on account of contracts that had been entered into with the men during the winter, will now put nearly all of the Corporation fleet of steamers into the first class. So, it would seem, the engineers will find it necessary to bring about a readjustment of their affairs with the big steamship company before a general settlement is effected, as other owners will very probably await the action of this leading interest.

ITEMS OF GENERAL INTEREST.

Mr. Cyrus C. Wells, who was secretary of Secretary of the Navy John D Long, has been appointed secretary of the United States Ship Building Co.

The London & Brighton Railway Co. has ordered a turbine steamer from Denny Bros. of Dumbarton. She is to be used in the company's Newhaven-Dieppe service

The steamer New England of the Dominion Line has just completed the fastest voyage between Queenstown and Boston making the run in six days, 6 hours and 30 minutes.

It is understood that the Luchenbachs of New York are to enter into competition with the American-Hawaiian Steamship Co for the freight business between New York and San Francisco and the Hawaiian islands.

The British first-class armored cruiser Drake, 14,000 tons, underwent her engines trials during the present week and proved herself to be the fastest cruiser in the world, having made 24.10 knots. The contract provided that she should attain a speed of 23 knots.

The New England Transportation & Steamship Co. has been organized at Augusta, Me., for the purpose of constructing and operating steamships. The capital stock is $500,000. The officers are Lewis A. Burleigh of Augusta, president, and Joseph Williamson, Jr., of Augusta, treasurer.

The cruiser Philadelphia has been put out of commission at the Puget Sound navy yard on telegraphic orders from the navy department. Extensive repairs are ordered which involve reduction of her height above water. The decks will be cut down to the main deck and all the rigging and machinery are to be overhauled and replaced where necessary. Work is to begin at once.

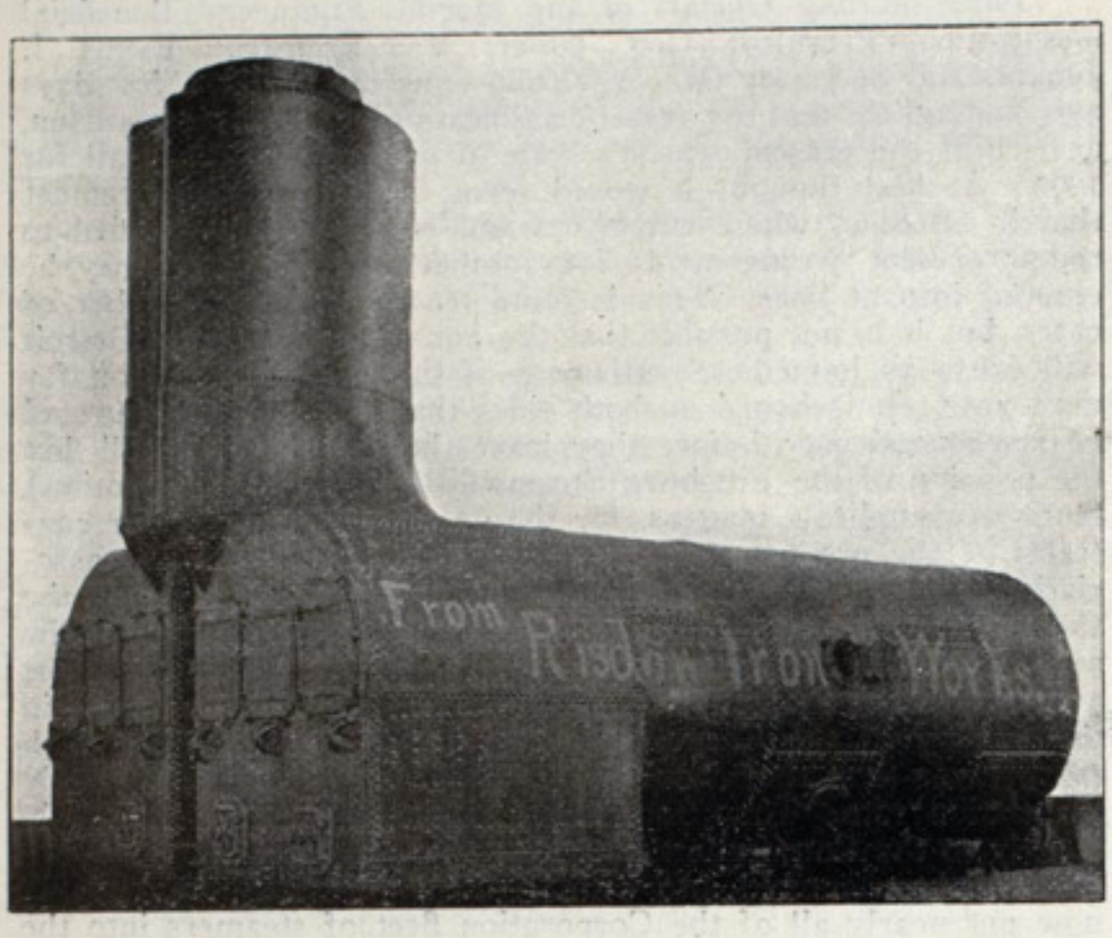
The navy department has decided to reject all proposals submitted for the construction of the concrete and granite dry dock to be known as No. 3 at the Norfolk navy yard. The bids for this work which were opened at the navy department recently were all high and complicated, so that it was determined to readvertise for the work after making some changes in the specifications.

The fifth conference of the International Maritime Committee is at present in session in Hamburg. Messrs E. P. Wheeler, J. B. Jackson, Gordon Murray and G. Betts represent the United States. The purpose of the conference is to obtain uniform legislation in maritime matters. A treaty relative to a uniform law for collisions and maritime salvage, framed by a special committee as a result of the resolutions of former conferences, was discussed as the opening topic.

The Mexican government has granted a concession to Jose Gabriel Escalante of Progreso, Yucatan, for the establishment of a line of steamers to be called the Yucatan Steamship Line, to ply between Progreso and New York, with the privilege of calling at Vera Cruz, Tampico, Galveston, New Orleans and Mobile. The Mexican mail will be carried free of charge, in compensation for which the vessels will be entered and cleared at any time, day or night, except national holidays.

BOILERS FOR A SAN FRANCISCO FERRY.

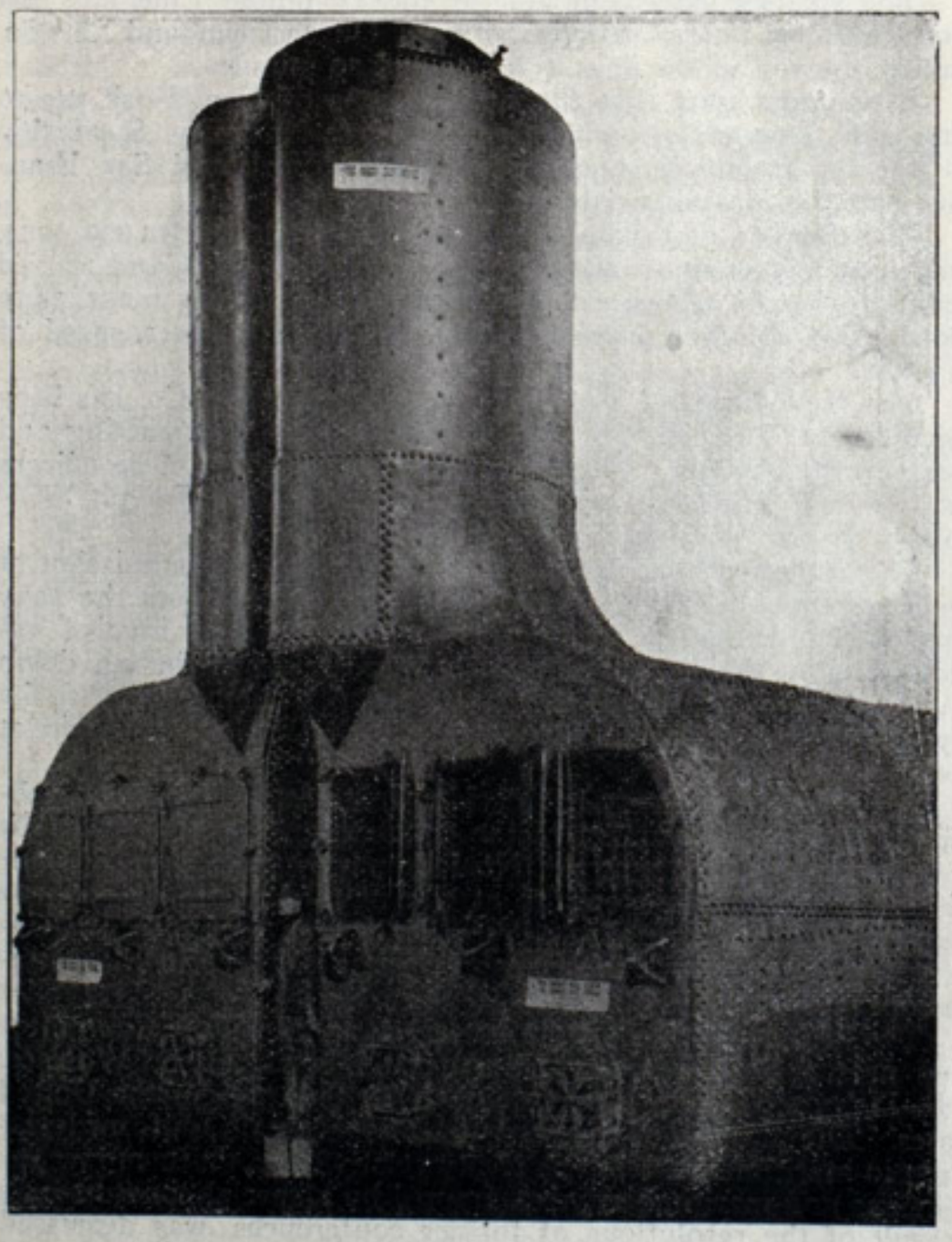
Three views on this page show a type of boiler that in most parts of the country is strange to marine practice of today. Two such boilers—to be operated practically as one boiler as shown by the illustrations—are building at one of the Cleveland shops of the American Ship Building Co. They have attracted a great deal of attention; not because there is anything new about them, but for the reason that boilers of their kind are



Type of Boiler for San Francisco Ferry.

seldom seen in marine shops these days. Their peculiar design involves considerable tedious workmanship. When completed, a few weeks hence, they will be taken down and shipped in sections to the Risdon Iron Works of San Francisco. The illustrations are not from the boilers now building but from similar ones built some time ago at the Risdon works.

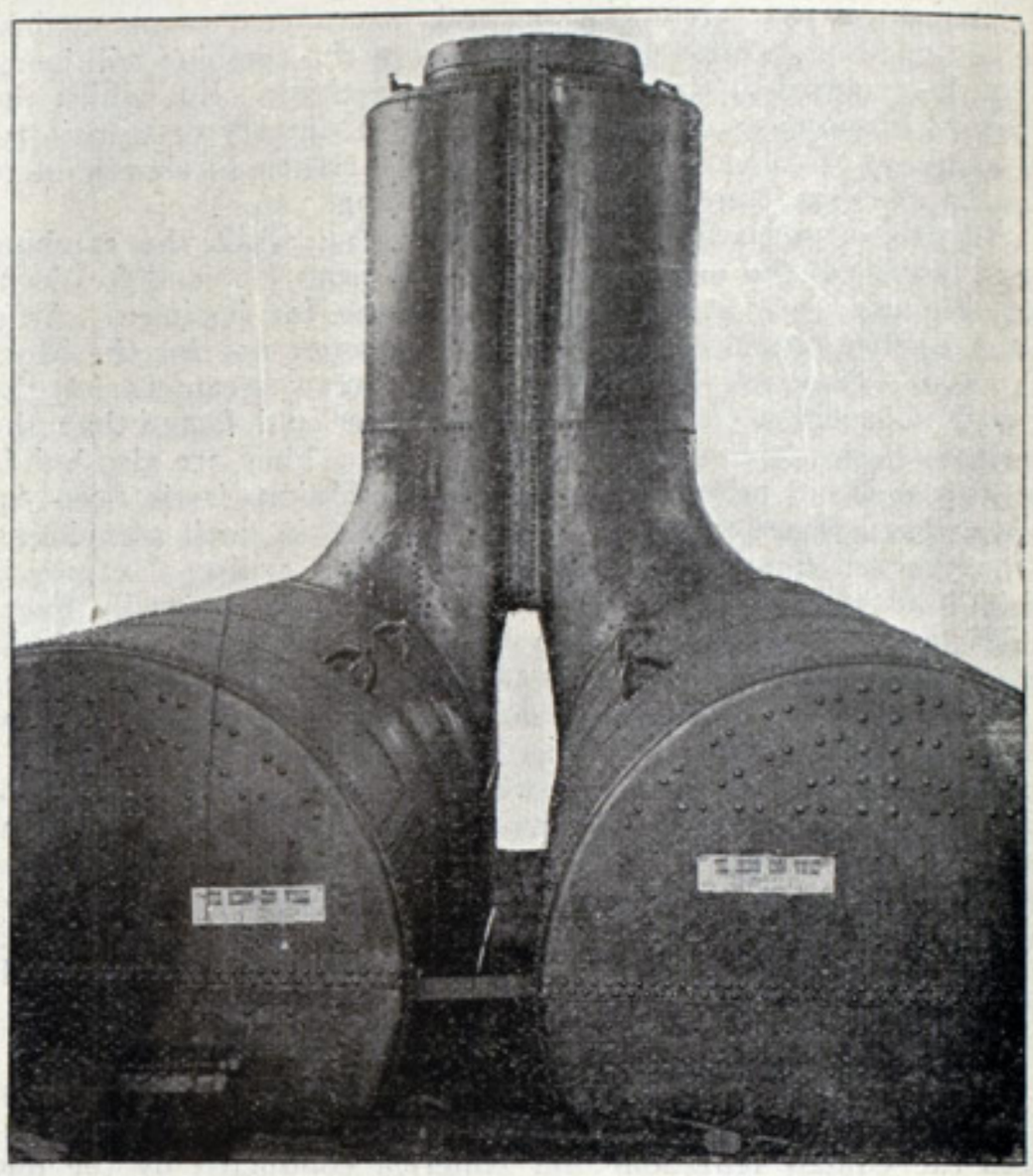
The boilers are for a passenger ferry that is building at the Risdon works for the North Shore Railroad Co. of San Francisco. Material could not be secured in San Francisco early enough



Type of Boiler for San Francisco Ferry.

to build the boilers there and have the ferry delivered on time, and the order was accordingly sub-let to the American Ship Building Co. The ferry, which is to be of wood, 206 ft. over all, 35 ft. beam (hull size), and 12 ft. depth, will be named Cazadaro, and in the service of the North Shore road between San Francisco and Sausalito will join two other similar vessels named San Francisco and Sausalito. The run is about 9 miles one way. It connects with San Francisco a suburban section in which passenger traffic is constantly increasing and a modern kind of ferry service is required. It is expected that this new vessel will cover the run both ways when necessary in little more than an hour.

Oil fuel, now so generally used in San Francisco, will be used in this vessel, and it is claimed that this type of boiler is especially adapted to the oil fuel and to the ferry service from an economic standpoint. The boilers will certainly have great heating surface. They are each of 29½ ft. length and 10 ft. diameter, containing nineteen 12-in. flues, one lot of 126 4-in. tubes and another of 132 4-in. tubes. The height, super-heater included, is 25 ft. The pressure is 75 lbs. Half-inch steel of 60,000 lbs. strength is



Type of Boiler for San Francisco Ferry.

used in their construction. Mr W. H. Pierson, engineer with the railway company, has been in Cleveland for several weeks past looking after this boiler work.

PERFORMANCE OF THE PIGS.

The attention of the iron world is riveted at present on the performance of the pigs. The oldest inhabitant of the globe does not remember a period like the present. Never before have the pigs behaved as they are behaving now; it is contrary to all experience. A cargo of pig iron recently arrived on the Clyde from Nova Scotia, being the fifth or sixth this year, and another cargo arrived on the Mersey. Altogether Canada has shipped about 60,000 tons to Britain. Yet in 1899 Canada took from Britain 11,394 tons; in 1900, 10,204 tons; and in 1901, even after the Nova Scotia furnaces were in blast, 9,158 tons. This year while still shipping to Britain she took 16,096 tons in the seven months ending July, and a still larger proportion, or 4,821 tons, in August. Here then is the curious fact that Canada is taking from Britain more than twice as much iron as she did before becoming a manufacturer herself and is also sending to Britain twice as much as she is taking from her. The position of the United States is equally inscrutable. In the three years just past England received from the United States 85,612 tons more pig iron than it sent her. Yet in the eight months of the present year Britain sent 211,317 tons of pig iron to the United States, or considerably more than half again as much as in the whole of the previous three years put together. Two years ago Germany was taking as much pig iron from Britain as she could get, and as fast as it could be carried. In 1899 she took 818,650 tons and in 1900 933,020 tons. Now she is sending back to Britain some of what she bought in 1899 and 1900 but was unable to consume. Yet while exporting this iron to Britain she was continuing to import. Thus we find iron, for the same purposes, passing in contrary streams between the east and west. The market is in a whirl and old stagers who cannot remember a like condition are staggering under it.

The Harlan & Hollingsworth Co., Wilmington, Del., has secured a contract to build a steamer for the Montauk Steamboat Co., of the following dimensions: Length, 250 ft.: beam, 62 ft.; depth, 14 ft. 10 in. She is to be a sidewheeler with a beam engine and is to cost about $225,000.

WATERBURY BRASS CO.

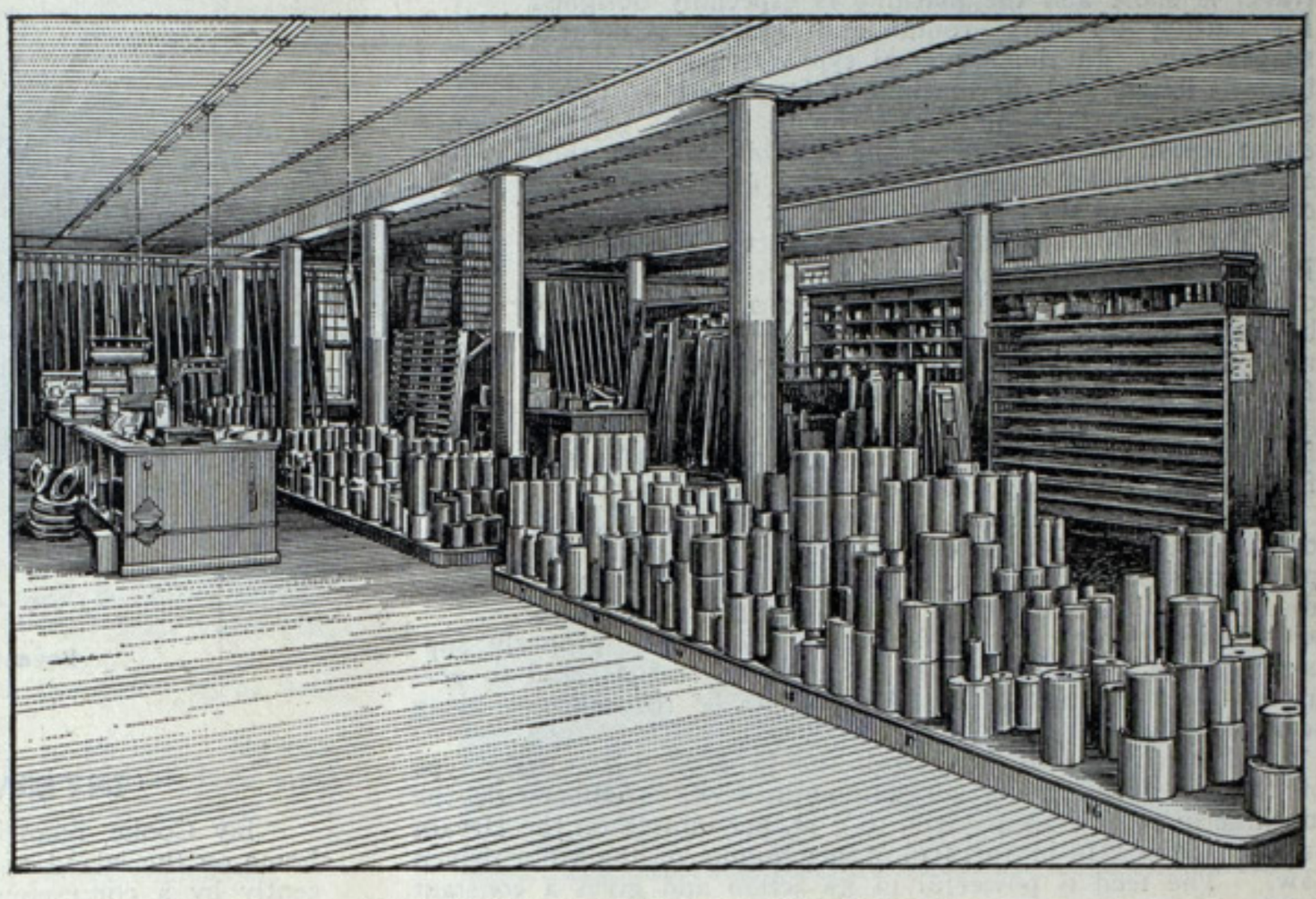
Seamless-drawn brass and copper tubes, brass and copper in sheets, rods, etc., and in fact these metals in all forms are used to a very large extent aboard vessels. It is of interest, therefore, to direct attention to the progress of a concern that is engaged in these lines on a very large scale. A couple of illustrations of the new warehouse of the Waterbury Brass Co. in New York, are presented on this page. The principal offices, mills and factories of this company are in Waterbury, Conn They have a store in Providence as well as in New York. The company is a very old one, organized in 1845. The first New York warehouse was established in 1846. The new warehouse, necessitated by a very large increase in business, is located at 122-130 Center street.

Present facilities of this company enable them to carry a much more complete stock than ever before, thus putting them in excellent position to fill orders promptly, and in view of the congested condition of mills just now this is, of course, a very great advantage. They are carrying in their New York warehouse upwards of a million pounds of brass and copper in sheets, rods, wire and tubing which is classified in a very comprehensive catalogue just issued, illustrating some of their lines and showing in classified form a great variety of brass, bronze, German silver, sheet copper and seamless-drawn brass and copper tubes. including iron pipe sizes. The book contains fifty-two pages, one-half of which at the back are devoted to tables of weights, measurements and rules of service to buyers ordering goods. The first part of the book is devoted to the stock the company is carrying. Ship builders and coppersmiths will be interested to know that they can secure promptly seamless-drawn copper tubes in 20-ft. lengths, which cut to great advantage, these being inside diameters and all Stubs' gauge thickness of wall, and in addition they are carrying Braziers' sheets

Office and Warehouse Building of Waterbury Brass Co., New York.

30x60 and 48x72; also yellow metal rods. They are prepared to execute from mill direct with promptness orders for special widths, thicknesses and diameters not carried in warehouse. They maintain a private telephone exchange with direct private wire to their mill, thus enabling them to keep in constant touch with orders in the course of manufacture at Waterbury, and to give prompt information. Anyone visiting the New York house is impressed with the enormous stock that is carried, which must mean, with the company's equipment, shipment to the buyer on the same day that the order is received. The buyer has two sources of supply in dealing with this company—their New York warehouse and the mills at Waterbury.

It is announced that this company have taken over the right to manufacture Pope's Island "White" metal, which is especially suitable to drawing, spinning and forming purposes, a marked feature of the metal being the high finish obtainable and its non-corrosive qualities, as well as permanency of color. It is most adaptable for metal wash stands and bowls because of these qualities. The Waterbury company's mills is one of the oldest in New England, and has always kept in step with improvements while the management has diligently guarded its reputation for supplying a high standard of material. If you have not already received their catalogue, it will be sent to you for the asking.



A Corner in Stock Room of Waterbury Brass Co.

MISCELLANEOUS MATTERS.

A dispatch from Christiana says that the Norwegian life saving society has experimented at Horton with Capt. Doenvig's new lifeboat, which consists of a life saving globe that can carry sixteen persons, 400 kilograms of provisions, and 500 kilograms of water. It carries an air pump and a water pump and is equipped with a sail and rudder. It is 8 ft. in diameter and is intended to stand on the deck, floating off if the ship carrying it goes down. The trials were successful. Capt. Doenvig, twelve seamen and three newspaper men entered the globe, which was then thrown overboard. It disappeared under the water for a time, but came to the surface, when the occupants hoisted a flag to show that they were no worse for their immersion. The sailing powers of the invention were successfully tested for an hour.

War time actively prevails at the Charlestown navy yard. Three shifts are being worked eight hours each. Never in the history of the navy yard have so many war ships been tied up undergoing repairs. Every available ship on the Atlantic and gulf coasts is being made ready to take part in the coming maneuvers in the Caribbean sea. Eight ships, not including the Olympia, are undergoing more or less extensive repairs at the navy yard. Some of the eight jobs are large ones. The two of the greatest importance are on the protected cruiser Newark and the Culgoa, each of which will amount to about $120,000. Both the Newark and the Culgoa are out of commission and are completely stripped of all their fittings. In addition the gunboat Machias, dispatch boat Dolphin, double-turreted monitor Amphitrite, gunboat Bancroft and gunboat Scorpion are being repaired. The Amphitrite's boilers will be removed and four new Babcock & Wilcox boilers will be installed.

Naval Constructor William J. Baxter, head of the Charlestown navy yard, has recommended to the navy department that a floating machine shop be built for use in repairing ships which may tie up at the wharves or which may anchor in the stream. At the present time it is necessary for a ship to be docked and the tools and pneumatic power tubes taken on board, before any work can be undertaken. Sometimes it happens that some of the fittings of the vessel have to be removed and sent ashore to one of the shops before the work can be properly done. Mr. Baxter's idea is to have a large scow, about 24 by 48 ft., built strong enough to support a great weight. On this scow it is intended to erect a machine shop, 20 by 36 ft. and also set up a large derrick for handling heavy weights. The shop would be equipped with a complete outfit for doing any ordinary repair jobs which may be undertaken. Electricity is the motive power recommended for operating the tools and a complete electrical plant will be installed if the idea meets with favor.

METAL CUTTING MACHINES.

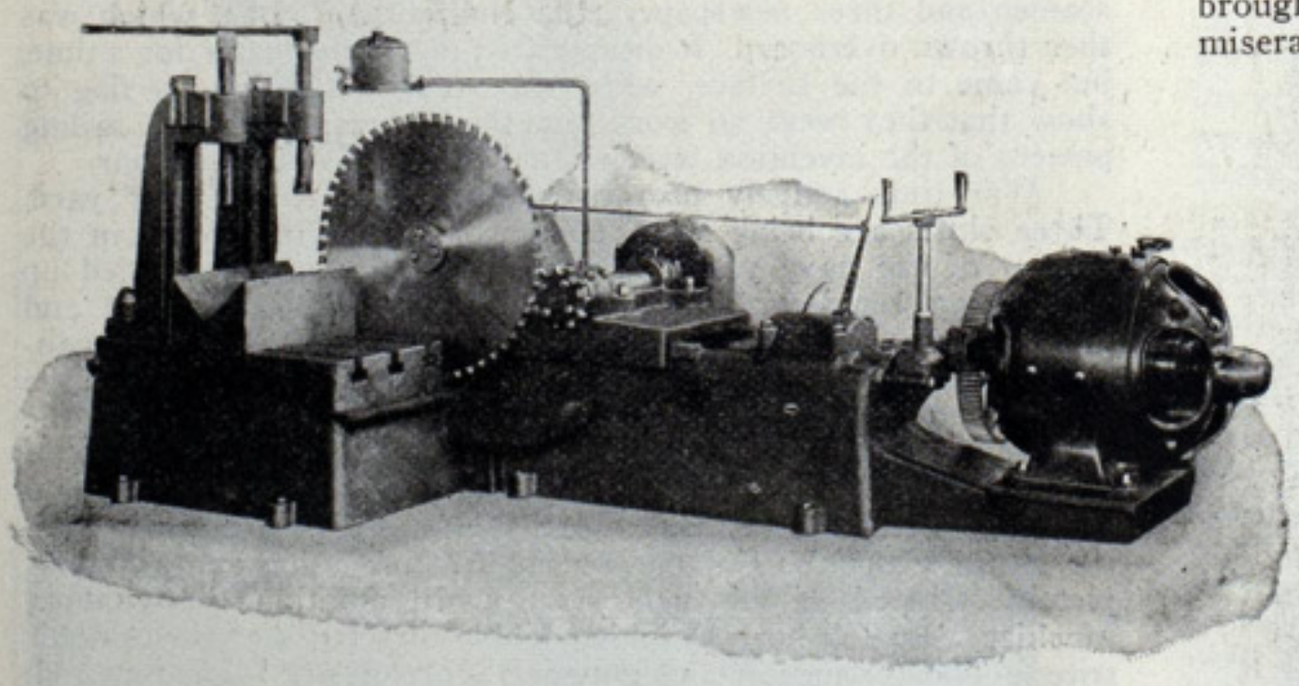
The Q. & C. Co. of Chicago, recently placed on the market a line of metal cutting machines that embody many novel features and improvements over those made by them in the past with which the users of this class of machinery have become so familiar. The new machines are of two distinct types—Bryant saws in which the saw blades is driven by a gear or Sprocket wheel engaging with the teeth forward on the periphery of the blade, and the arbor-driven saws, on which the saw blade is driven by a central mandrel or arbor. Both types of these saws are made in two styles, cut-off saws and universal saws. In the cut-off type the blade travel is short and the machine is especially designed for cutting off bars, round and square, structural shapes, etc. In the universal type the travel of the blade is longer and the machine is fitted with an upper side table, on which the work can be cut off for the entire length of the travel of the saw blade, while they are also arranged with V blocks and lower tables for cutting bars and shapes.

The illustrations herewith show two views of a Bryant cut-off type of machine, one belt-driven, and the other motor-driven. Any machine can, when desired, be mounted on circular base which can be completely rotated by track and pinion, this being a very desirable feature where there is not sufficient room for swinging a long beam. Lateral adjustment of side tables can be furnished if required, so that the work can be adjusted for cutting after being secured.

Special attention has been given to the arrangement of the tables on all machines, so that work can be placed most advantageously for cutting with a minimum distance of blade travel. The lower side tables are of sufficient length to enable beams, etc., to be properly supported when being cut off at any angle up to 45°, and to permit of steel castings within the capacity of the machine being secured to it.

All machines are fitted with the Q. & C. Co.'s latest type of friction feed, giving an automatic feed variable with the machine in motion from ¼ in. to 1 in. per minute on the Bryant saw and from 3-16 in. to 13-16 in. per minute on the arbor driven saw. The feed is powerful in its action and gives a constant driving force throughout its entire range. The feed wheel is connected to the feed screw by a clutch operated by a lever, by moving which it is engaged or disengaged. In the universal saws the clutch also operates the power return movement with which these machines are fitted. A rod attached to this lever engaging with the carriage, operates an automatic stop in both directions. When the clutch is disengaged, the carriage can be moved in either direction by hand. The feed nut is solid, 6 in. in length, and bushed with bronze. It is bolted and tongued to the carriage, and can be readily removed without dismantling the machine.

The Bryant saw carriage is in two parts, the sprocket shaft bearing being cast in one piece with the worm gear hood,

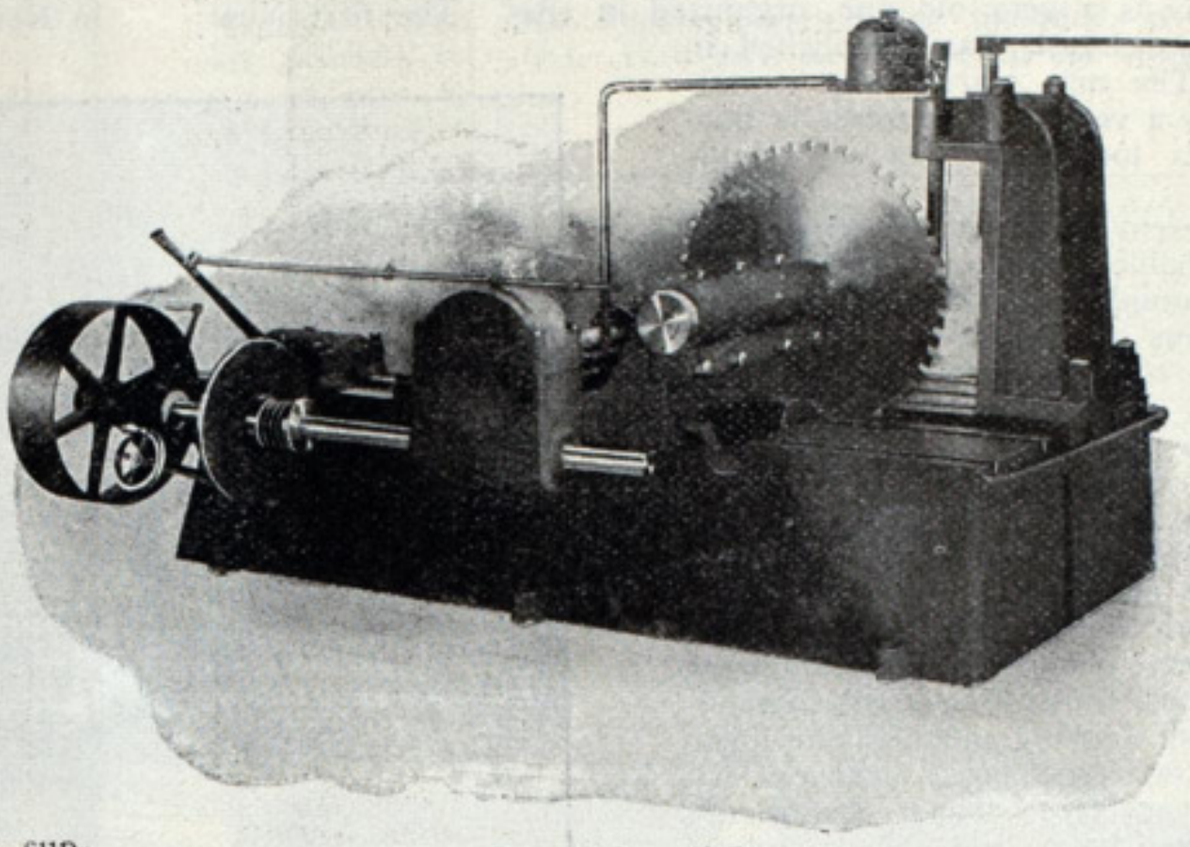


Bryant Cut-off Saw.

and moveable 2½ in. towards the axis of the blade, allowing for a wear of 5 in. in its diameter. The sprocket is removeable, and all sprockets on these saws are interchangeable and readily replaced.

The arbor-driven saw carriage is of good design and exceedingly strong and rigid. All bearings are divided at right angles to the direction of the wear and are of extra large proportions. Both arbor gear and pinion are solid with the shaft, the pinion being hardened. The width of the face is large and the liberal proportions employed have produced a very rigid and quiet running machine.

All gears in both types of machines are entirely enclosed, avoiding dust and the wear it entails when machines are not advantageously placed. The shears and tables are of strong and rigid design and are provided with oil troughs so that all lubricant is returned to the central trough and underneath the saw blade. As the Q. & C. Co. are the only manufacturers of both these types of machine they are in position to furnish to their customers that type of machine which experience has shown to be best adapted to accomplish the required work with the greatest possible economy. Further information and catalogue can be obtained from the Q. & C. Co., Western Union building, Chicago, or 114 Liberty street, New York.



Bryant Cut-off Saw.

INTERVIEW WITH JAY COOKE.

Jay Cooke, financier, who has been very ill at his summer home on the island of Gibraltar, Lake Erie, was interviewed recently by a correspondent of the New York Herald upon the causes of the present unexampled prosperity of the country and the likelihood of its continuance.

Mr. Cooks says that protection has been the secret of the country's rise to industrial greatness and adds that while that principle is maintained it will advance irresistably. The United States is no longer compared with other nations but with the world. With less than 5 per cent. of the population and only 7 per cent. of the area, the United States is, nevertheless, about equal industrially to half the remainder of mankind. With a rehabilitated merchant marine, an Isthmian canal, continued protection, peace and prosperity, the future must hold even more wonderful results for the United States than any that have transpired.

"My father," said Mr. Cooke, "was a member of congress, a Whig of the Henry Clay school, and from my youth I was brought up to believe in protection as against free trade and such miserable heresies. For seventy years I have watched the growth of the principle until it has reached its logical place and the spread of prosperity has made my conviction sure."

"This prosperity, then, will last?"

"It will endure so long as the American people are true to the principle of protection. The natural wealth of the country is vast; there are still great areas uncultivated, great storehouses of power yet undeveloped. With stable conditions the steady tide of wealth will rise. Some things I achieved in my life which are remembered, and these I achieved because I had perfect faith that the American people would establish and cling to the principles that have made the nation industrially great. My belief was justified.

"Have I not grounds for my confidence? It has been my fortune to see the country grow. I went to St. Louis as a boy of sixteen, when it had a population of 7,500, and Chicago was still Fort Dearborn and a few shanties. I went to Philadelphia in 1838. Its population was 225,000 while that of New York was only 165,000. My father obtained the first charter for a railroad granted anywhere in the world, and I have had something to do with nearly every railroad since built in the United States. Therefore the wonderful progress we have made unrolls itself before my memory as a great panorama, and when I see the steady growth, the magnificent advance, I can not but believe that the nation is destined to greater things. I know something of our undeveloped resources, and I repeat that few of us have yet grasped the possibilities that lie before us."

"Do you see danger in the trusts?" was asked.

"None that will not correct itself. I can not share the alarm expressed by Russell Sage in this regard. This is a big country and big capital is needed to operate its industries. Combination necessarily works towards the general wealth. You remember the Northern Pacific and the Great Northern, when Morgan and Hill were fighting for supremacy. By a common

sense arrangement they got together, and now money that would have been wasted in useless wars is being poured out in improvements that benefit the public. All these great enterprises of capital work for the good of the nation. I have been able to see it in my own experience. I projected and built the Northern Pacific railroad—I lost a fortune in it, by the way, but made another—and in a few years what a change has taken place! Over thousands of miles where formerly only wild beasts and Indians roamed, the traveler passes now through busy towns and prosperous farms, and on every side the roofs of school houses and the spires of churches mark the advance of civilization. Capital did that. The constant outcry against wealth, merely because it is wealth, is wickedly wrong. We know that only a few men can be capitalists, and if they use their capital for the development of the country's resources they should be encouraged and not antagonized.

"Men like Morgan are making this country great. Instead of wasting their time and money in useless pleasure they are devoting arduous labor and brain power to organizing great enterprises and developing forces which increase the wealth of the nation. They prosper greatly, it is true. But it is absurd to say that they prosper at the expense of the people. They prosper with them. Such men should be encouraged and not attacked."

"You have witnessed the rise of a great many large individual fortunes?"

"Yes, indeed. In my busiest days I suppose Stephen Girard's fortune was the most noted accumulation of wealth. And today one can not possibly keep track of the millionaires. They might almost be called unnumbered. Why, just the other day I saw a paragraph in the paper concerning the payment of the largest life insurance premium ever settled. And, though I am fairly familiar with the names of wealthy men, this man's name—it was Smith, by the way—was quite unknown to me. Wealth is springing up on all sides. Fortunes which would have been considered magnificent a few years ago are lost sight of now."

"You do not agree with the view that the piling up of vast individual fortunes holds a national menace?"

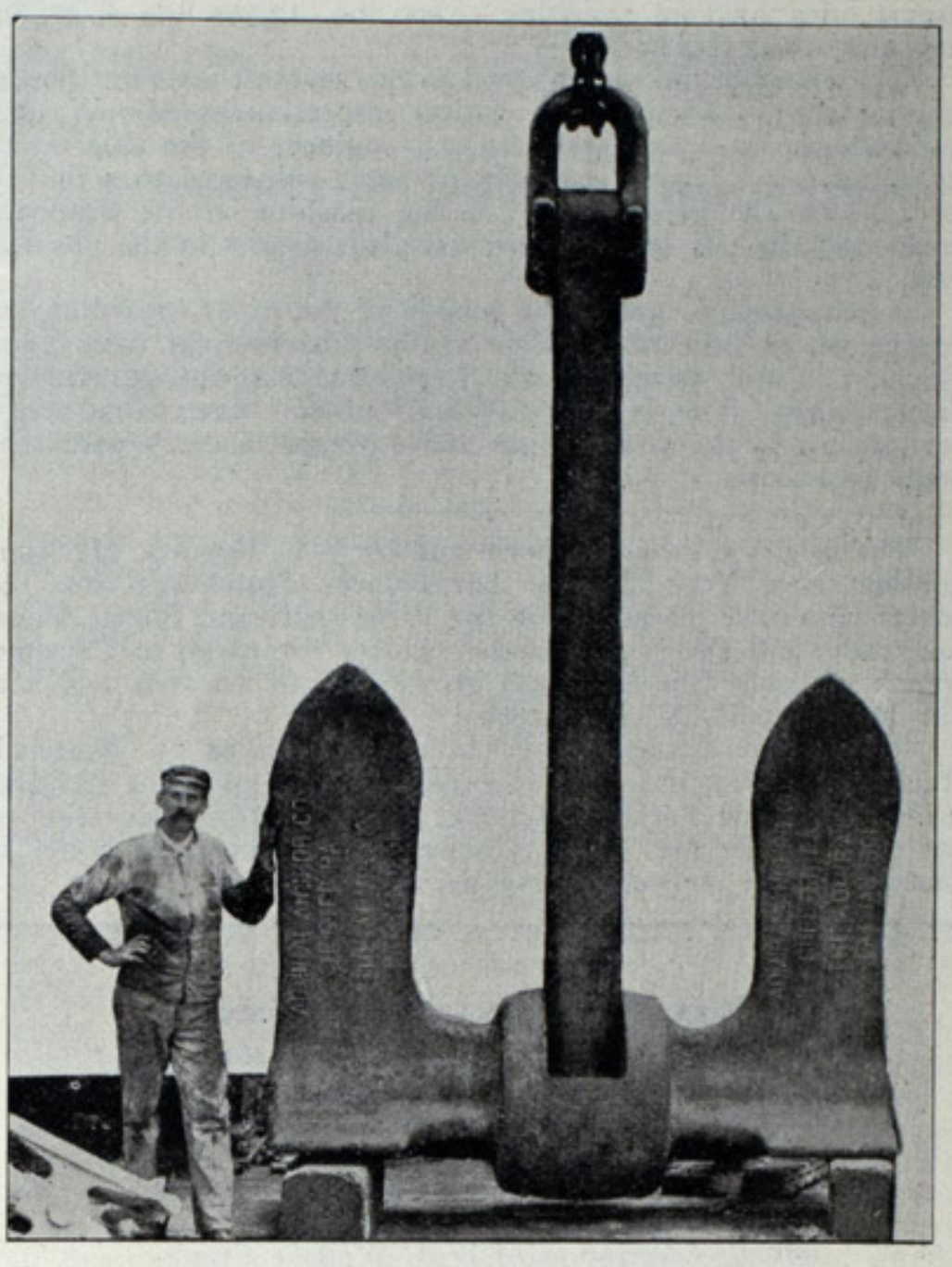
"Not a bit of it. Rockefeller's money is all here. Morgan won't eat his millions. These fortunes could not have been built up except through the prosperity of the people as a whole, and to the people the money will eventually return."

And this fine old optimist smiled with cheery confidence.

The lighthouse board advertises elsewhere in this issue for bids for the construction of the twin-screw lighthouse tender Magnolia for service at Port Eads, La. The bids will be opened Oct. 29.

THE LARGEST ANCHOR.

The accompanying cut gives a view of the largest stockless anchor ever made, if it is not, indeed, the largest anchor ever



made. It is a stockless anchor of the Admiral type, and was made by the Seaboard Steel Casting Co. of Chester, Pa., for the Eastern Ship Building Co., New London, Conn., and is one of a

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will make a leaky casting steam tight, and the way it cures such defects as blow holes, shrink holes and other common blemishes is a revelation.

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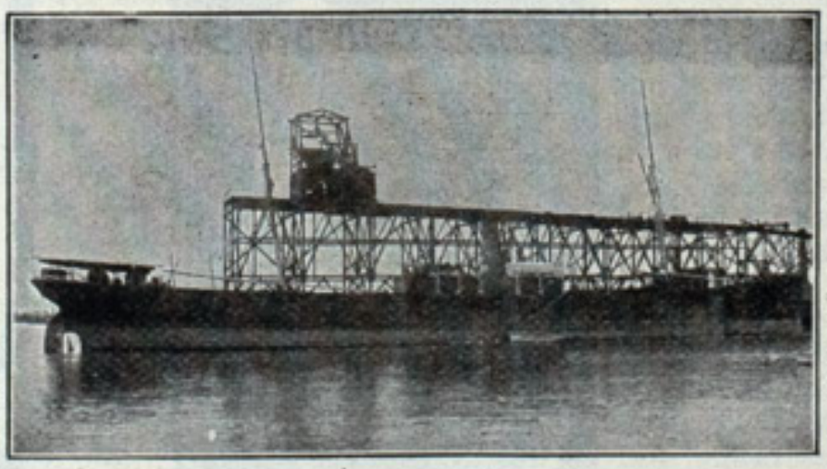

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H. B. Saunders, Esq., New York, N. Y.

Dear Sir:—In answer to yours of January 4th, I wish to state that Smooth-On Compound is the very best cement that I have ever used, and I can safely say that had I been without it I could not have continued with boilers without considerable interruption; and furthermore state that during my experience of 30 years in ships of several nations, I have never found anything to equal it. and I can without hesitation safely recommend it to any one that is troubled with leaky boilers, as I am positive that if they give Smooth-On Compound a fair trial they will receive the same good results from its use that I have.

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VREELAND TOMPKINS, CHEMIST AND MANAGER.

522

pair of this size for the immense ships being built by that company for the Great Northern Railway's Pacific line. This anchor weighs, complete, 16,800 lbs., or almost 8½ tons, and is cast from the highest grade of open-hearth cast steel. The equipment of Admiral anchors on each of these ships includes, besides these largest ones, anchors weighing 14,000 lbs., 12,320 lbs., 5,740 lbs. and 3,020 lbs., respectively.

These anchors were subjected to the severest tests by Lloyds' representatives and the most critical inspection by Mr. William A. Fairburn, the naval architect and engineer of the ship building company. The largest anchors were subjected to a pull of 200 tons on the great anchor testing machine in the Seaboard works and the test bars showed excellent results in the physical tests.

A paragraph is going the rounds of the press regarding the forging of an immense anchor at the Charlestown navy yard, which, it is said, weighs nearly 8 tons and cost the government almost $2,000. This is fully two and one-half times what a cast steel anchor of the same weight and stronger in every particular would have cost.

The brig Venturer has been sold by J. C. Roberts, Maritime building, New York, for her late owners, Hutchings Bros., to parties who have placed her in the West India and South American trade, and she is now under charter for cargo to Cayenne, French Guiana. She is of 348 gross and 318 net tons and was built at Liverpool, N. S., in 1886.

Mr. George Crouse Cook, naval architect of 15 Whitehall street, New York, has been appointed lecturer in naval architecture for the New York city schools, by the board of education of that city. While Mr. Cook is quite a young man the honor is considered well merited among his acquaintances.

Passenger Steamer Wanted.

Wanted.—To lease passenger steamer for next season's business, allowed to carry 500 or 600 passengers, to run on Spring Lake, Michigan, in connection with the Grand Rapids, Grand Haven & Muskegon Third Rail Electric Railway. Address, giving description of boat, Wallace Franklin, Secy., 1014 Union Trust Bldg., Detroit, Mich. Oct. 9.

Small Passenger Steamer Wanted.

Wanted.—A small passenger steamer between 90 and 100 ft. long, with fore-and-aft or triple-compound engine and good boiler. Speed not less than 14 or 15 miles an hour. Address Box 297, Washburn, Wis. Oct. 9.

Judge Lacombe has granted a restraining order upon the application of the Chicago Pneumatic Tool Co., restraining the Philadelphia Pneumatic Tool Co. from making, selling or using tools in infringement of the Moffet patent, owned by the Chicago Pneumatic Tool Co., until further order of the court. An injunction had previously been issued against the Franklin Boiler Works, a user of one of the tools manufactured by the Philadelphia company, but the latter company claimed that, as this injunction was not against them directly they were at liberty to continue to manufacture and sell such tools. But Judge Lacombe's order now prevents them from further infringing the Moffet patent. The defendants are required to appear before Judge Lacombe in October and show cause why a permanent injunction should not issue against them.

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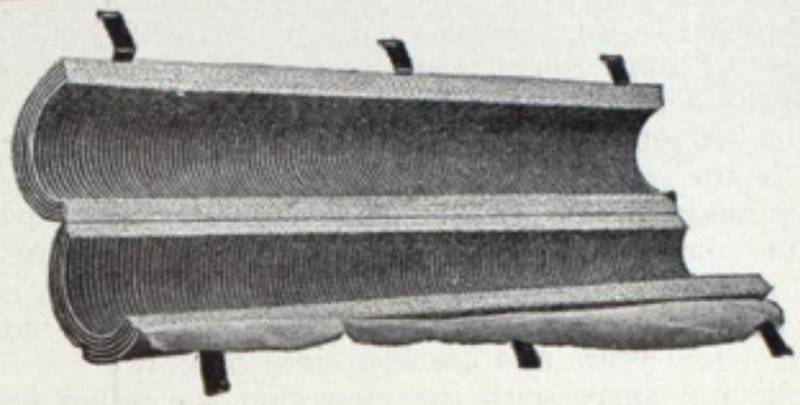
SECTIONAL PIPE COVERING.
(Patented.)



Consists of several layers of corrugated asbestos paper, placed so that the corrugations run CONCENTRICALLY AROUND THE PIPE. Each channel, therefore, forms a closed loop, in which the air is effectually imprisoned, instead of forming a long channel through which more or less circulation can take place, as in longitudinal air cells.

These circumferential channels occur between each of the several layers, forming a covering of the highest insulating efficiency.

We manufacture money saving insulating coverings to meet every requirement under all conditions, and should, therefore, be glad of an opportunity to take the question up with you in detail.

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